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## STANDARDIZED PREPARATIONS.

By H. H. Rusby, M. D.

In accordance with the kind invitation of the editor of this journal, and with the assurance that the discussion is to be conducted in a manner befitting the importance and dignity of the subject, I offer my last suggestions previous to the meeting of the Convention on the subject of the extension of standardization in the next edition of the *Pharmacopœia*, directing attention particularly to the effects of standardization upon the business of the retail pharmacist.

Such extension must depend upon the will of the physicians of the United States. Whether the conclusion is or is not satisfactory to anyone concerned, it is indisputable that if the physicians of the country desire standardized preparations, and anyone is ready to furnish such preparations, they will have them. The conclusion seems unavoidable that such is their desire. The use of standardized preparations is not an untried experiment. They have been used by many physicians with such satisfaction that there is a growing call for them, and we cannot escape the conviction that the demand will shortly become general. Just how strong is this feeling at the present time cannot be determined until the voice of the physician is heard upon the floor of the Convention. But if my impression is correct, then it can be set down as a fact that standard ized preparations of such drugs as admit of standardization are going to be very generally prescribed before one-half of the next decade shall have passed away. If pharmacists do not blind themselves to this fact, they will be compelled to ask the question that naturally arises, "Shall we furnish these preparations?" What else, let us ask, can they do? Which way will their decision most certainly

work advantage to others and disadvantage to themselves; by taking the manufacture of such preparations out of the manufacturers' hands, or by deliberately refusing to do so? If there were anything in the past history of retail pharmacy which indicated a power on their part to determine the character of the medicines which physicians will use, then we might see some hope of their determining the action of the profession in the present instance. But who can deny that, willing or not willing, they must follow the direction of the medical profession. To me it seems that the gravest possible kind of a mistake will be made by the pharmaceutical profession if it shall pronounce a verdict not only contradictory to its high and just pretensions as a scientific body, but utterly useless for any other purpose than to cut its members off from participation in the benefits, professional and commercial, of a condition whose arrival cannot be stayed. How much better is it, accepting the inevitable, to take an honorable part in its promotion, and at the same time to so influence the movement as to make it tend, so far as possible, to their own best interests. As a matter of fact, the retail pharmacist ought to be the sole pecuniary gainer by the introduction of standardized medicines, and so he can be if he only will. Neither is there any doubt in my mind that there has been a general perversion of sentiment in favor of the very course that is most opposed to his interests, and against that which is calculated to most greatly benefit him. The committee on revision will surely be competent to decide how far the application of the principle is practicable.

Apparently there is at the present day little doubt that the weight of influence, in pharmacy as well as in medicine, lies in the direction of adding to the list of standardized drugs. It would appear that there is no doubt that this action will be taken by the Convention. But it is not so certain that pharmacists will favor the extension of standardization to any of the preparations. Here again much will depend upon the attitude of the medical profession. It is doubtful if they will be satisfied with the standardization of an article which they do not use, and the exclusion of the same principle from the preparation of it which they do use. If the standardization of the drug itself is a sufficient guarantee of uniformity in the preparations made therefrom to constitute practically the application of that principle to the preparations, then the formal standardization of such preparations is but a form, and the

credit therefor may as well be taken. But if upon the other hand, the standardization of the drug alone furnishes no guarantee of the uniformity of the preparations, and the latter must be taken solely upon trust, then it is certainly not a business-like proceeding, notwithstanding that we may entertain the utmost confidence in all parties concerned. Recently a number of very prominent writers upon this subject have offered the weighty argument that such of the ordinary color reactions, precipitation and other tests for active constituents as can be readily applied by the average pharmacist, are not sufficiently definite to exclude sophistication. Freely admitting some difficulty in this direction, the reply can still be made, that attempts at such sophistication are extremely unlikely to be made, however possible it might be to make them. The retail pharmacist, upon whom the responsibility rests, is certain not to do so, whether he manufacture his own preparations or whether he prefers to purchase them. If he purchase his preparations in original packages, then the jobber or wholesaler cannot tamper with them except under such risks as would not be taken once in a century; and no one who is familiar with the supersensitive pulse of the manufacturer can believe that he would dare venture upon such an attempt, the discovery of which—ultimately more or less certain —would not only impose legal penalties, but the destruction of his patronage.

Moreover, it is not true that this difficulty actually exists in the case of all active constituents. There are a number—and according to some authorities of unquestioned ability and experience, a considerable number—of them, the positive identification of which is sufficiently easy for the average pharmacist. Can we not with perfect confidence leave the investigation and decision of these questions to the ability and good judgment of the committee of revision, merely instructing them that it is the wish of the Convention that standardization should be extended to the preparations where it is in their opinion, admissible.

If, as it is to be hoped, such action shall be taken, the question as to what preparations shall be standardized is no less important. In the last number of the Pittsburgh *Medical Review*, the editor, than whom no more earnest and conscientious contributor is to be found in the land, argues that a new line of preparations should not be established, but that those already provided should be used for

this purpose. But the results of the action which he thus advises would be damaging. Aside from the danger of accidents resulting from the sudden substitution on the prescriptions of physicians, and unknown to many of them, of an article for which they have made no requisition, and in many cases very much stronger than they desired and expected, there is the objection that such action would impose upon pharmacists the worst form of the particular evils, with the smallest amount of the special benefits, which they are to experience as the result of the change. Suppose, for instance, that all the preparations of opium, or the most used of them, were to be placed under this rule. Then, wherever there was a pharmacist who was incompetent, or otherwise not in a position, to apply such a principle in his manufacturing operations, he would be absolutely compelled to purchase the whole of this class of products from the manufacturing houses. Just so far then, as the frequently asserted claim is true that pharmacists are not capable of doing this work, so far would the manufacturing business be taken away from him by the application of standardization to the preparations already provided. Probably during the first year or two no very large portion of the prescriptions sent him would be written with an intelligent desire for the application of the principle of standardization. The pharmacist would thus be put in a position of being compelled to do that which he claims is unprofitable and inconvenient, in advance of the intelligent action of the physician and in a way whose suddenness is calculated to do him the largest amount of harm. If, upon the other hand, a special preparation were provided to represent the standardization principle, then the appearance of such article in the physician's prescription would be a clear indication that such physician was expressing an intelligent wish for the application of that particular principle to his prescription, and no reasonable pharmacist would object to taking any steps necessary to satisfy the demand. If then, it were specially inconvenient for the pharmacist to manufacture such preparation at the time that the change went into operation, no interference to his business would be caused until time had been given him to gradually prepare himself for the change. His own ability and convenience would grow with the demand for the preparation, and everything of a radical nature in the proposed change would be eliminated. This increase in the number of preparations would not be permanent.

By the time that the next revision of the Pharmacopœia were made, the old fluid extract could simply be dropped and the new preparation, which would by that time have replaced it in actual practice, be substituted for it.

As regards a name for such a line of preparations, the question is too trivial a one to be publicly discussed. The committee of revision has always consisted of men thoroughly honorable and perfectly judicious, and they can be relied upon to select a fitting name.

The time preceding the meeting of the Convention is now very short, and it is most earnestly to be hoped that the conclusions of the delegates which shall be reached within the next week shall be the result of a broad and unbiassed consideration of the question.

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## THE STANDARDIZATION OF OFFICINAL DRUGS AND PREPARATIONS.—A PLEA FOR THE TRUTH.

By G. M. Beringer, Ph.G.

Read before the Philadelphia College of Pharmacy at the Pharmaceutical Meeting, April 22.

The standardizing of the drugs and preparations of the pharmacopœia is a subject which is now attracting a great deal of notice in the pharmaceutical press and which will undoubtedly claim the attention of the committee on revision. Unfortunately, the discussion has resulted in a mass of glittering generalities and harsh personalities have been indulged in to such an extent that there is danger of the vital points of the discussion being overlooked.

The standardizing of preparations would not prevent the dishonest dealer from selling goods below the standard. We have in our present pharmacopœia standards of purity for most chemicals, yet such articles as cream of tartar and precipitated sulphur are met with most grossly adulterated, and many of the commercial chemicals do not answer the officinal requirements. Has the assaying of opium prevented the dishonest druggist or wholesale manufacturer making laudanum below the officinal strength? Has there been any improvement in the quality of this article, as sold by the country store-keeper in bottles, since our Pharmacopœia introduced a method of opium assay? The term "country laudanum" is still applied by dealers in the article to a mixture containing a variable quantity of opium and a great deal of caramel and water. Standardization is not the panacea for this evil.

Here I would like to make a suggestion to the pharmaceutical associations. It has become customary for us to have a yearly report from a committee on adulterations, and these reports have been printed and given to the public as monumental proofs of the dishonesty of pharmacists. Instead of publishing such reports in future let the committee prosecute all cases where there is evidence of deliberate adulteration or falsification. Ten convictions would be a more wholesome lesson than ten thousand reports.

It behooves us to take a glance backward and see whether the methods of assaying organic drugs introduced in the last Pharmacopœia have met with anything like universal favor or adoption. The Pharmacopœia of 1880, introduced methods of assaying and fixed standards for such organic drugs as Cinchona, Opium and Pepsin. Have these been accepted as authority and generally adopted? The method of opium assay has been severely criticised, and it is doubtful if to-day a handful of chemists are following this method. Nearly every chemist who does much of this work has his own modification of Squibb's, Flückiger's or other proposed methods of assay. The introduction of the so-called strong pepsins necessitated some new method of assay. The officinal process for assaying saccharated pepsin was declared to be faulty, primarily because the results given were not high enough. To-day every manufacturer of this article is offering some modification of the pharmacopœial or national formulary test, especially devised to show the superiority of his product over that of competitors. Their sole idea appears to be, not to find the most accurate method, but to so alter the conditions as to obtain the greatest apparent digestive value.

These two cases serve but to illustrate the probable fate of methods of assay introduced in the Pharmacopœia. If any manufacturer desires for business purposes to show increased strength or value in a preparation, he will simply drop the officinal standard, puff himself and preparation through the advertising columns of the medical and pharmaceutical journals and circulars to physicians. The physician in search of a new lesson in materia medica seldom stops to inquire what are the officinal requirements; but, at the first opportunity prescribes Jones' Solution of Pepsin, or Liquor Ergotæ Dick's and obtains results identical with those he had previously obtained from the preparations of the neighboring pharmacist made in accordance with the officinal standard.

Even if it were possible to assay every organic drug and standardize every preparation, this would not remove the uncertainty in medicine. Physicians, as a rule, learn the uses of remedies and their doses methodically and he who could tell the percentage of alkaloid in extract of nux vomica or the amount of morphine he administers in a dose of tincture of opium is a rare exception. While the physician very properly demands exact remedies he is as a rule unable to define the limits of exactness required. Again, the observing physician carefully notes the peculiarities of his patients. In one patient quinine in small doses will produce a severe headache. In another, but small doses of belladonna or hyoscyamus will produce a very marked effect while in the next maximum doses may be necessary. So, then, the dose necessary in every individual patient, has to be carefully differentiated. A fact which the radical advocate of standardization seems to forget is that nature cannot be confined to a straight line that there is a certain amount of variation in individuals either organized or organic.

The respectable pharmacists of this country desire no looseness or indefiniteness in pharmacopœial preparations, and if any advance is made in this direction, you can rest assured that it will be the result of the labor of the pharmacist.

It might be asked, do the so-called active principles, alkaloids, glucosides, etc., represent the true medical action and value of drugs? If so, assays are a true measure of activity; if not, they are of questionable value. If so, the problem would be a very simple one, namely, in all cases prescribe the alkaloids. But the physician carefully differentiates between the cases in which he prefers nux vomica or strychnine, opium or morphine; and I have seen physicians who professed to obtain better results from fluid extract of cinchona than from the cinchona alkaloids.

By far the most important query, however, is: Is our knowledge of organic drugs and their constituents such, at the present time, as to enable us to chemically estimate their medical value?

The life history of but few medicinal plants has been satisfactorily studied. Of many we know nothing as to the variation due to collection at different seasons of the year. We know that colchicum is most active if collected while in flower or just after, yet it is generally collected several months before. It is pretty certain that podophyllum varies considerably at different seasons, and it is not

unlikely that the variability noted in gelsemium is due to the same cause. Of the effects of cultivation, altitude, climate, character of soil, etc., we as yet know but little. It is also pretty certain that drying and age alter materially the character of the active principles. Again our knowledge of the chemical nature of the active principles of most drugs is, at least, very uncertain, and in many we are as yet unable to decide, on what ingredient the activity depends; as for example cannabis indica. In ergot we cannot accept the alkaloids of Wenzell, Tanret and other investigators as representing the activity of the drug. In the great bone of the contention, however, the important solanaceous drugs we are confronted with a serious difficulty. Accepting the results of Ladenburg we find three alkaloids atropine, hyoscyamine and hyoscine, all having the same forumla $C_{17}H_{23}NO_3$, but these same alkaloids vary greatly physiologically. No process of assay such as could be made officinal would serve to separate the hyoscyamine from atropine in belladonna and stramonium or hyoscine from hyoscyamine in hyoscyamus. According to some recent investigations the alkaloid of belladonna is hyoscyamine which in the course of extraction is converted into atropine. Or what is probably true is that the composition varies with the age of the root or season when collected. There is yet room for a thorough scientific study of the subject. If these alkaloids existed in nature associated in a definite proportion an estimation of total alkaloids would be sufficient. In veratrum and digitalis we are confronted by analogous conditions. An assay under such circumstances can certainly be of little value in correcting the uncertainty of medical practice. While admitting the desirability of some method of determining the medical value of such powerful drugs an attempt to standardize such would result in making uncertainty more uncertain. Our foundation is too unstable to permit the rearing of a fine super-structure.

The alkaloidal principles are associated in drugs with other organic substances such as resin, coloring matter, tannin, vegetable acids, inert alkaloids, etc., and it is frequently difficult to separate the active principle in anything like a pure condition in a single operation. Frequently it requires several additional purifications before it can be satisfactorily determined. It certainly would be a serious error to estimate the percentage of alkaloid from the weight of crude residue obtained, yet this is recommended in some of the

processes published. Some few of the alkaloids of a decidedly basic nature can be estimated volumetrically by their saturating power with sulphuric or hydrochloric acids. The proposed methods of titrating with Mayer's reagent or with phosphotungstic solution are admittedly incorrect in many cases. An assay of aconite is likely to be falsified by the presence of napelline and other inert bitter principles, and the difficulty of obtaining the alkaloid in anything like a pure condition is proven by the experiments of C. R. A. Wright, Groves and other investigators. Again aconitine is very prone to change from exposure to heat or to treatment even with weak acids or alkalies to the amorphous aconine, of greatly reduced activity.

The analysis of organic drugs is a matter of great scientific value and interest, but we are compelled to admit that many of our processes of assay are faulty, admitting of but imperfect results, the principal value of which must be as a guide to the purchaser of lots of crude drug to enable him to decide approximately their value and freedom from inert material. When such a comparatively simple assay as that of opium will yield in different hands such results as reported by Teschemacher and Smith (*Chem. News*, 1888, 104), is it likely that assays of belladonna or aconite would yield results at all valuable? The writer would like to see a practical demonstration of this and would suggest that a good commercial lot of either of these drugs be procured by some uninterested expert, carefully powdered and mixed and samples distributed to say a dozen recognized analysts throughout various sections of the country, results to be reported to him at a fixed time. This would yield a valuable practical demonstration of the value of the pharmacopœial assaying and do more to satisfactorily settle the question than much talking. It is doubtful if a majority of the quinine experts of Europe would to-day agree upon the method of assaying and the purity of a sample of quinine salt.

The writer sees no good reason why nux vomica should not be required to contain a certain percentage of mixed alkaloids; as the total percentage of alkaloids here present brucine and strychnine does not vary greatly, and the physiological action of brucine is similar to but weaker than that of strychnine. Such drugs as cantharis, podophyllum, jalap and others will undoubtedly admit of assay. In many, perhaps, the quantity of extractive obtained with various solvents will be a valuable indication of purity.

Whatever the committee decide on, we hope will be the result of careful examination by competent unprejudiced investigations. Any processes adopted must be simple, requiring not too great an amount of time or expert knowledge and chemical skill to place them beyond the ability of the average pharmacist. The manufacturer, who has much assaying to do, will be compelled to engage a chemist, who will study up accurate methods of assay as the practical pharmacist studies the correct methods of manipulation. But the latter, with the multiplicity of details and customers claiming his attention, can not be expected to find time for exact investigations of the constituents of drugs.

The processes adopted must be practical and fairly accurate to ensure their general acceptance. We must not forget that our Pharmacopœia is intended as a guide and hand-book for the mass of pharmacists and not as a dictionary or encyclopædia for the expert.

As such, clearness and practicability are infinitely more valuable than absolute scientific accuracy. The danger of too radical changes can not be overestimated. Let us remember that our zeal should not outrun our discretion. There is no need of great haste, and every change should be thoroughly considered before the advance is made. "Truth is established by investigations and delay; falsehood prospers by precipitancy."

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## PHARMACOPŒIAL REVISION AND ASSAYS.[1]

By Dr. E. R. Squibb.

The directions for the description of crude drugs seem also to have been sufficient and satisfactory in the main, but in a few instances they do not seem to have been fully carried out by the Committee. This point may lead to discussion in the Committee, but probably not in the Convention.

The directions for the description of chemicals have of late excited much important discussion. It is directed that Opium and Cinchona shall have detailed processes of assay for the alkaloids, and that the minimum percentage of total alkaloids required be given under Cinchona, and the minimum and maximum of morphine in Opium be prescribed. No fault has been found with these direc-

[1] From the annual address of the retiring President of the Kings County Medical Association; reprinted from *Ephemeris*, April 1890, p. 1263.

tions, but it has often been claimed with much force, that now processes of assay should be directed for all the important crude drugs, even including those which have no definite, separable, active principles. This claim seems to be an outgrowth of experience obtained by the leading step taken in regard to Cinchona and Opium, but this is certainly not the case, for no one who has had much experience with Cinchona and Opium assays can have escaped the difficulties and uncertainties of these. The assaying of crude drugs for their active principles seems an easy matter to those who only read and write upon the subject. But those who attempt to practise the processes soon get a very different impression, for there is really nothing more precarious and uncertain than these assays in general hands with but a small experience in such work. Assay processes might perhaps be wisely directed for a few additional drugs such as Aconite, Belladonna, Conium, Hyoscyamus, Ipecacuanha, Jalap, Nux Vomica, Scammony and Veratrum Viride.

Pharmacopœial processes of assay will be successful or unsuccessful in proportion to their character. If they aim at a high degree of accuracy and precision they must, necessarily, be elaborate and complex to a degree that places them beyond the reach of general pharmaceutical ability. But if they aim at only the very moderate degree of accuracy, such as satisfies the careful manufacturer in the selection of materials, rough processes of approximate assay may be found that are sufficiently easy of application to be successfully applied to pharmaceutical ability and usage through the authority of the Pharmacopœia. While most of these rough and ready processes are secreted in the hands of manufacturers, yet enough of them are published to give the Pharmacopœia opportunities of selection in these, and in the trials of selection similar processes for all would be naturally reached. Including Cinchona and Opium eleven drugs have been named which might have processes of assay given in the Pharmacopœia, and if high degrees of accuracy be not aimed at, a moderate amount of work in the selection of proper menstrua would enable the Pharmacopœia to apply the shaking out process to all these articles with results sufficiently close for the present scope of the Pharmacopœia, and sufficient to prevent the Pharmacopœia from depending upon either experts, manufacturers, or commentaries. For example, a simple and easy process for Opium assay, which in hands of ordinarily educated pharmaceutical

skill and ability would have a maximum range of probable error of not more than a half of one per cent. above or below the truth—might be better adapted to the pharmacopœial usage of the present time, than a critically accurate chemical process with a range of error of a tenth of a per cent.—first because no two samples of the same lot of Opium, whether moist or in powder, would come within this small range of error; and next, because such a process would require a degree of expert knowledge and skill rarely found in pharmaceutical practice.

Another important consideration not to be overlooked is, that with the exceptions of Cinchona, Jalap, Opium and Scammony, the drugs named can always be bought by pharmacopœial description and tests, of such quality as to yield preparations of practically uniform therapeutic value. The claim frequently heard that all pharmaceutical preparations from crude drugs should be made or adjusted by assay is so plausible and attractive, as to form a most fertile basis for specious advertising by manufacturers of these preparations, and if the Pharmacopœia could be committed to this or any similar doctrine it would put much money into the pockets of large manufacturers, and just to that extent would divert practical pharmacy from its legitimate channels and proper responsibilities. In the first place, the claim is untrue and unfair because a very large proportion of important drugs have no separable active principle that can be determined by assay, and therefore their quality cannot be determined by assay, nor can their preparations be adjusted by assay. Out of some ninety officinal drugs in all, there are about thirty-four of the more important ones which may be fairly represented by Ergot, Rhubarb, Senna, Wild Cherry, Dandelion, Columbo, Gentian, Butternut, Pareira, Cotton Root, Cimicifuga, Buckthorn, Leptandra, Sarsaparilla, Spigelia and Stillingia, which could not be adjusted by any ordinary processes of assay, and which do not need it if they could, because care in buying them by pharmacopœial description and tests, rather than by price, will always easily obtain a uniform good quality, at moderate cost. Again, while a fair degree of accuracy and uniformity in the strength of galenical medicines is most desirable, any strain after a degree of accuracy that is not necessary, nor available if attained, is hurtful by whatever is sacrificed to attain it. In the therapeutic uses of medicines, doses are anything but definite or accurate in quantity.

Of the same medicines different individuals require different doses to yield the same effect. And even the same individual requires different quantities at different times and under differing conditions, and the real dose is that variable quantity that yields the peculiar effect of the agent. How then can the physician avail himself of any degree of critical accuracy beyond that practical uniformity of strength and quality upon which his experience is based, or any degree of critical accuracy which is beyond the limit of accuracy determined for him by variable individual susceptibility? All that is true and sound on this point is that a practical degree of uniformity is all that can be attained by the Pharmacopœia without any such system of elaborate assaying as would tend to throw this important interest of the Pharmacopœia into the hands of experts, or would-be experts. The line of wise action seems not difficult to draw here. If the descriptions and tests of the Pharmacopœia can be improved without carrying them beyond the reach of educated pharmaceutical or medical skill in application, this should be done, applying assay processes only to such drugs as have easily separable active principles. Then a a very few preparations, such as those of Opium, Nux Vomica, and perhaps Cinchona, might wisely have their strength adjusted by these assays. There has never been a time within the forty years' experience of the writer, when officinal drugs were more accessible to those who would take the trouble to look for them, and be willing to pay for them; and to those who will not take the proper pains, nor pay adequate prices, the Pharmacopœia would continue to appeal in vain, even by the most elaborate system of assays and adjustments, if such a system was practicable.

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## PHARMACOPŒIAL ASSAYS OF DRUGS AND GALENICALS.

By John M. Maisch.

Read before the Philadelphia College of Pharmacy at the Pharmaceutical Meeting, April 22.

Discussions on the standardization of drugs have of late years claimed much attention in medical and pharmaceutical literature. The object of the present paper is not to review the entire field covered by the arguments, but merely to present a few considerations, which have not heretofore been dwelled upon, or which, in the writer's opinion, have not received the consideration they deserve,

yet in view of the nearness of the pharmacopœial revision should be thoroughly examined and carefully weighed.

The unbiassed observer must acknowledge that the pharmacists, as a class, have honestly endeavored in the past to perfect the processes of the Pharmacopœia, and to render the galenical preparations as uniform in composition and as permanent as possible; the revisions of the National Pharmacopœia during the past fifty years bear ample testimony to this fact. Even processes of assay were introduced at the request of pharmacists. They made their appearance for the first time in a modest way in the Pharmacopœia of 1860, which required that "*Opium* (crude) should yield at least seven per cent. of morphia by the officinal (Staples') process;" and the quality of *scammony* was defined by requiring that "Ether dissolves at least 75 per cent. of it; and when the ether has been evaporated, the residue, dissolved in a hot solution of caustic potassa, is not precipitated by dilute sulphuric acid."

Both these processes are in consonance with the character of the Pharmacopœia as a law book; and in following them, the product obtained by the one could only consist of morphine contaminated with some narcotine; and the results of the other could only be due to scammony resin—provided that well-characterized opium and scammony had been subjected to the assays. In other words, the processes were in the main correct, but the Pharmacopœia had omitted to describe the material which should be subjected to these tests.

The Pharmacopœia of 1880 supplied this deficiency, and it has also improved the morphiometric test for opium. According to our present knowledge, opium as described by the Pharmacopœia, when examined by the process laid down by the same authority, yields as a final product the alkaloid morphine in a reasonable state of purity; no other alkaloid—at least none of those ordinarily occurring in drugs—can be present; the process is adapted for morphine, but for no other alkaloid.

The old process for the assay of scammony has been retained, and coupled with the pharmacopœial description of the drug, excludes other ether-soluble convolvulaceous resins, even orizabin (jalapin of authors) which has been shown to be chemically identical with scammonin. For the resin of the orizaba root cannot be manipulated so as to have the physical characteristics of the scam-

mony obtained by the spontaneous evaporation of the látex of the living scammony root.

In the two cases cited the requirements are clear and unmistakable, as a legal requirement should be, and it will be observed that such is also the case with the few other drugs for which processes of assay have been introduced into the last Pharmacopœia.

The officinal process for determining the digestive strength of *pepsin* may not be the best that can be devised; but in connection with the described physical characteristics identifies the article with sufficient exactness and establishes a minimum standard of quality which is perfectly reliable for the conditions given.

On assaying *cinchona* bark for total alkaloids by the pharmacopœial process, the resulting product consists of quinine, cinchonine and allied alkaloids, provided the identity of the bark as being derived from a species of Cinchona or of Remijia has been established; for by the same process a number of poisonous alkaloids may be prepared; and if, for instance, a strychnos bark (some of which are now met with in commerce) were tested in the same manner, strychnine and brucine would finally be weighed. It follows from this that, if cinchona bark or its powder had become accidentally mixed with strychnos bark, the alkaloids of the latter would be weighed as cinchona alkaloids. The same is also true of berberine, hydrastine, and some other non-poisonous alkaloids which are not freely soluble in a solution of sodium hydrate. The pharmacopœial estimation of *quinine*, which is based upon the sparing solubility of its sulphate in water, excludes all other alkaloids likely to be met with, even berberine sulphate being more freely soluble in neutral aqueous liquids; but if crystallizing, would reveal its presence by its yellow color. It will thus be seen that, while the pharmacopœial requirements for the percentage of quinine are, according to our present knowledge, sufficiently perfect as a legal standard, the assay for total alkaloids can be thus regarded only in connection with the absolute identity of the drug itself.

The remaining drug for which the present pharmacopœia prescribes a process of assay is *jalapa*, which is required to contain at least 12 per cent. of resin of which not over 10 per cent. (1·2 per cent. of the drug) should be soluble in ether. These requirements should be considered in connection with those given under *resina jalapæ*, excepting the faulty one with ammonia water, and are suffi-

cient to establish the identity and purity of the drug and the product obtained. Incidentally it may be remarked, that the German Pharmacopœia, which requires a minimum of only 10 per cent. of resin, will probably reduce the amount to 8 per cent., and the same may be necessary in this country, although it is well known that roots of much higher grade *may* be found. As it is likely that the subterraneous part of the plant will survive the winters in most sections of the Southern and Central United States, it is to be hoped that its cultivation, which appears to present no difficulties or unusual labor, may be undertaken, so that a supply of better quality of the drug may be regularly obtainable. In regard to the ether-soluble portion of the drug, it is well known that its percentage varies; but in the past experience of the writer, it rarely exceeds 10 per cent. of the total resin, and is mostly less than this amount. Since the water-soluble portion of the *alcoholic extract* of jalap possesses decidedly purgative properties, it may, however, be questioned whether an assay of the drug, based solely upon its resinous constituents can secure the absolute uniformity of other galenical preparations than the officinal resin, and it is obvious that for preparing the latter, a previous assay is not necessary.

In suggesting the standardization of other pharmacopœial drugs, writers have usually selected such which contain alkaloids, and for determining the percentage of the latter, recommended, in most cases, either the volumetric estimation of the liberated alkaloids by acids, or the employment of Mayer's solution. Though this test liquid is an excellent reagent for alkaloids, it cannot lay claim for giving unvarying results, since these are in many cases affected to a considerable extent by different degrees of dilution. And since its general behavior to all alkaloids is alike, the precipitates obtained with it from acidulated solutions merely prove the (probable) presence of alkaloid without identifying it. Such a process evidently lacks the first requisite of a legal requirement, definiteness; for pharmacopœial purposes it would be applicable only to the drug as there described, but not to the powder, tincture, extract or other galenical preparations.

But is there really such an urgent necessity, overpowering every other consideration, for requiring all drugs furnished by nature to contain a definite percentage or a minimum amount of a certain constituent, or mixture of constituents? This is extremely doubt-

ful for all those drugs which can be readily identified by their physical characters, and which have not been subjected to fraudulent manipulations. The three species of Cinchona formerly recognized by most pharmacopœias, viz: *C. Calisaya*, *C. succirubra* and *C. officinalis*, furnish unobjectionable bark for pharmaceutical purposes, and no assay—indispensable though it may be to the manufacturer of quinine—would be necessary for the uses of the physician or pharmacist; the introduction of barks, many of them of very poor quality, obtained from botanically allied trees, and possessing similar macroscopic characters, rendered the identification of the former doubtful, and chemistry was called upon to supply the needful means for determining the main constituents without regard to origin.

Why the quality of commercial jalap has deteriorated, is not known; possibly Prof. Flückiger's suggestion (see March number, p. 142) may be correct, and since the fraudulent manipulation (if the drug has been subjected to such) has been skilfully concealed, the necessity exists for the estimation of the remaining resin.

The milk juice of scammony root became adulterated in former years through the cupidity of the importer limiting the purchasing price to a figure below the cost of production, no less than through the cupidity of the producer.

Even at the present time we have no definite knowledge of the extent to which the composition of the pure milk juice of the poppy varies in the different districts of Asia Minor; but it is known that the opium from various localities may vary in morphine strength to the extent of several hundred per cent. Moreover, its original characters as an exudation are entirely obliterated by the manipulations it is subjected to before it enters the market; its physical characters approach those of the extracts, the external appearance of which is indicative of their remedial qualities only to a limited degree.

Now let us briefly consider one of the most powerful drugs of the Pharmacopœia, *nux vomica*. This seed is easily recognized, and its freedom from admixtures may be established without difficulty. It has been frequently the subject of chemical examination, and two of its powerful alkaloids, strychnine and brucine, are well known and are met with in commerce; yet the residuary products left in the manufacture of these commercial alkaloids, have never been satisfactorily

examined, although they have been shown to contain notable quantities of both strychnine and brucine; they still await researches similar to those made by Liebig and others, and later by O. Hesse, into the nature of the residuary products of quinine manufacture. But granting, for the sake of argument, that the two alkaloids named fairly represent the total alkaloidal constituents, it has been found that the total percentage of alkaloids varies in the commercial article generally between 2·5 and 3·5. In a sample of Bombay seeds, Dunstan and Short determined (*Year-book*, 1883, p. 235) 3 90 per cent., and in one specimen (*ibid.*, 1884, p. 463), taken directly from the fruit, 5·34 per cent. was obtained. Now, regarding the ordinarily best results with commercial samples (3·5 per cent.) as pure strychnine, one-twelfth grain of this alkaloid would be represented by 2·38 grains of nux vomica; or by double this amount (4¾ gr.) if strychnine be regarded as constituting one-half of the total alkaloids. All these quantities are within the limits of allowable large doses; but no prudent physician would *commence* with such doses of such a potent medicine.

There is still no process known by which strychnine may be absolutely and completely separated from the other strychnos alkaloids. Dragendorff (*Werthbestimmung*) regards the two principal alkaloids as being present in approximately equal proportion. Dunstan and Short (*loc. cit.* 1883, p. 469) have followed a method of separation which, in their hands, has given approximately correct results. On calculating the relative percentage of strychnine to the total alkaloids, as determined by them from commercial tinctures and extracts, it will be found to vary for the tinctures between 32·7 and 49·8 per cent., and for the extracts between 35·8 and 50·1 per cent., the extremes being in the proportion of 2 to somewhat over 3. It is known that brucine has an action, which is, qualitatively, very similar to that of strychnine, but quantitatively, differs very materially, according to Falck, being weaker in the proportion of 38·5 to 1. Calculating, upon this basis, the activity of brucine into strychnine, the latter would be represented, instead of the mixed alkaloids, by the figures 34·5 and 51·4, the proportion of the lowest and highest, or weakest and strongest being very nearly the same as before, 2 : 3. It is evident, therefore, that the determination of the total alkaloids will *not* secure the asserted uniformity; it will even not lessen the uncertainty to any appreciable degree.

The uncertainty would be considerably reduced, though not entirely removed, if an absolutely reliable assay of strychnine could be made; and until this is accomplished, physicians will have to continue to prescribe the alkaloid strychnine or one of its salts, if they aim at producing definite effects, which they believe not to be obtainable from nux vomica or its preparations owing to the inherent variation in their composition whether the drug be standardized for total alkaloids or not. There would be no harm done if the Pharmacopœia would require, say not less than 2·5 per cent. of total alkaloids; but the necessity for it is not apparent since it will be difficult to find in commerce nux vomica containing a decidedly smaller amount. It should also be stated in this connection that, in the writer's experience, the amount of strychnine obtained in the manufacture on a tolerably large scale, is usually considerably less than might be expected from the figures given above.

It seems unnecessary to enter in a similar manner into details with regard to other drugs containing alkaloids. When examined into without bias, it will be found that the different alkaloids present in the same drug, if qualitatively of the same action, usually differ considerably in their quantitative effects; that not unfrequently the qualitative effects of such alkaloids (for instance, in aconite, veratrum, etc.,) differ from one another very markedly; and that for both these reasons a knowledge of the total amount of alkaloids cannot give a correct idea—on the contrary, must be frequently misleading—as to the value of such an assayed product compared with the effects of its principal medicinal alkaloid in an isolated condition.

A practical difficulty for such assays on the scale required for the pharmacist consists in the correct sampling of the drug. Different specimens of aconite root, of nux vomica, of the narcotic leaves, etc., taken from the same parcel, will be found to give results differing more or less; and to preserve in several samples taken from the same lot, the relative proportions of old and young roots, or of rhizomes and rootlets will prove to be a most arduous task. In one essay giving an account of their excellent researches on nux vomica (*loc. cit.* 1884, p. 463), Dunstan and Short state that "the alkaloidal content of the seeds is directly as their size and inversely as their number in the fruit." These are conditions which pharmacopœial

requirements cannot influence, one way or another. It is obvious, then, that a correct and uniform sampling of such drugs can only be accomplished by grinding the parcel and mixing intimately—in other words, by destroying the physical identity of the drug.

Other difficulties might be mentioned, but in the writer's opinion, those cited appear to be the most prominent ones. Some excellent suggestions on this subject were presented to the British Pharmaceutical Conference in 1884, in two papers written by Mr. G. F. Schacht and by Mr. D. B. Dodd (*Year-book*, 1884, pp. 480, 485); they discuss in a clear and unimpassioned, but convincing manner the claims for standardization and some of the fallacies, and are in marked contrast to some papers which made their appearance more recently on this side of the Atlantic.

In the beginning of these remarks I stated that in the past, pharmacy had endeavored—I now add that she honestly continues in her endeavors to perfect pharmacopœial processes and to render galenicals as permanent and uniform as possible. To reach the theoretical perfection, a great deal of labor will have to be performed, and many intricate researches will have to be carried out to a successful issue, by physiologists, by therapeutists, by chemists and by pharmacists. In the meantime, ordinary prudence demands that a praiseworthy object should not be jeopardized by laying a treacherous foundation, and that the Pharmacopœia should not sanction processes which, in their results, do not and cannot prove that at which they aim, and consequently introduce uncertainties, and even sources of danger, equally great or greater than existed before.

In closing these remarks, I cannot more fittingly summarize them, than by quoting the conclusions arrived at, from a different starting point, by Mr. Schacht in the paper cited above: "Bodies of definite chemical composition and their dilutions are eligible for standardizing; but preparations of the nature of vegetable (drugs) infusions, tinctures, extracts, being for the most part mixtures of indefinite and unknown agencies, cannot be standardized without risk of misleading. Whenever any one of this latter class of bodies has been so studied that the remedial potencies and chemical properties of all its elements are declared by authority to be well known, that one passes from the latter class into the former."

# ON A CRYSTALLINE PRINCIPLE FROM XANTHOXYLUM FRAXINEUM.[1]

By J. U. Lloyd.

As early as 1829[2] an analysis was made by Mr. Edward Staples of the bark of this shrub and a crystalline substance identified, to which he affixed the name *Xanthoxyline* (now Xanthoxyl*in*). Next, Dr. R. E. Griffith[3] refers to the shrub as a drug, and mentions this constituent. In 1876, I presented Prof. Maisch samples of a crystalline substance, obtained from the bark of the shrub, which, together with a brief description accompanying same, were presented to the college by Prof. Maisch at the pharmaceutical meeting, May, 1876.[4]

This is the record of the substance under consideration, so far as my knowledge can carry it, and it seems probable that your college specimen is the only considerable amount in existence, and possibly the only specimen purified since fifty years before, when Mr. Staples observed the crystals to which he referred. It will, I think, be evident to others who refer to my description of 1876 (as it is to myself), that the substance mentioned by Mr. Staples as crystals that separated from an evaporated tincture, were identical with the material I presented to Prof. Maisch, and that my work confirmed his statement.

Since it is evident to me that this body is of little if any medicinal value, it may be regretted that it should have been honored by so characteristic a name as xanthoxylin, although from a chemical view it may yet prove very interesting.

This body exists in the dried bark and is easily obtained, simply the act of extracting the plant with any solvent that will dissolve a fat, also removing it readily. Upon evaporation of the solvent, the substance crystallizes throughout the residual oily magma. Exposure to a low temperature facilitates its separation from the oleaginous companion, but even then considerable amounts remain in solution in the (often green) viscid fixed oil that is extracted from

[1] From a letter to Prof. Trimble, read at the Pharmaceutical Meeting, April 22.

[2] Am. Jour. Pharm., Oct., 1829, p. 163.

[3] Am. Jour. Pharm., 1837, viii, p. 195.

[4] Am. Jour. Pharm., 1876, p. 226.

the bark in considerable amounts by any menstruum that will dissolve the xanthoxylin. Repeated crystallizations from hot alcohol finally yield it white and in a state of purity. If desired it can then be obtained in large colorless needles, or it may be thrown down amorphous by adding cold water to its concentrated hot alcoholic solution.

Owing to the loss by the solvent action of the fixed oil that accompanies and holds much of it in solution I prefer to make it by the following method.

Exhaust the bark of Xanthoxylum fraxineum with alcohol. Distil the alcohol from the percolate, and wash the greasy residue with water. Mix a weak solution of caustic potash with the oily magma and stir until the oil is saponified. Separate the undissolved material by means of a muslin strainer (mostly xanthoxylin), wash it with water, dissolve it in boiling alcohol and cool. The crystals of xanthoxylin can be purified by recrystallization from hot alcohol. As before remarked, however, this substance dissolves in fat solvents, such as ether, benzol, etc., and any of these menstruums can be employed to extract it from the ground or powdered drug, and also to effect its subsequent purification.

Evidence that I accept as conclusive, instructs me that xanthoxylin is therapeutically inert. Like many similar crystalline bodies, (proximate plant constituents) it is of interest from a chemical rather than a medical stand, and the desirable constituents of xanthoxylum do not, in my opinion, embrace this seemingly characteristic body.

Chemical investigation may find a home for it among well-known classified bodies, thus, rendering the name also inappropriate from structural relationships. That xanthoxylum bark contains substances of marked peculiarities and decided characteristics is evident, although these points were, of course, unknown to Mr. Staples. It is probable, I think, that the substance deserving the name xanthoxylin will prove to be amorphous, it may not be capable of isolation intact under present imperfect methods of manipulation, and yet that such a body exists those who have cause to work considerable amounts of the drug and are observing, have, I think, every reason to believe.

# PRICKLY ASH BARK.

By E. G. Eberhardt, Ph.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.—No. 71.

Read at the Pharmaceutical Meeting, April 22.

In the preceding paper attention is drawn by J. U. Lloyd to a crystalline principle obtained by himself and other investigators from the bark of Xanthoxylum fraxineum. In addition to the references there given I may state that this substance was subsequently observed also by Geo. H. Colton (Am. J. Pharm. 1880, p. 191) and Edward T. Moffit (ibid. 1886, p. 417). The latter obtained it from Xanthoxylum fraxineum and regarded it as identical with that observed by Lloyd and Colton. Mr. Colton operating upon the bark of Xanthoxylum carolinianum obtained it from the petroleum ether extract and describes as follows: "These crystals . . . were obtained in tasteless, colorless, silky needles, readily soluble in alcohol, ether and chloroform, less soluble in benzin, insoluble in boiling water or solution of potassa. When heated on platinum foil they fused and burned with a smoky flame. Gently heated on paper the substance fuses to a transparent resinous mass, which dissolves in alcohol and can be obtained in crystals on evaporation of the solution"

## PRINCIPLE FROM XANTHOXYLUM CAROLINIANUM.

In order to further investigate the substance a quantity of the bark of Xanthoxylum carolinianum, furnished by Eli Lilly & Co., of Indianapolis, and obtained by them directly from their source of supply in the south, was exhausted with petroleum benzin, the solvent recovered by distillation in vacuum and the residual oily liquid set aside for the crystals to form. These were finally collected and recrystallized from alcohol until nearly colorless. They melted at 119° C., and a preliminary combustion of ·2228 gm. yielded ·5511 gm. of $CO_2$ and ·1108 gm. of $H_2O$; equivalent to 67·46 per cent. of carbon, 5·52 per cent. of hydrogen and, in the absence of nitrogen, 27·02 per cent. of oxygen.

The crystals were now further purified by treatment with animal charcoal and recrystallization from hot alcohol. By this means they were obtained in colorless, silky needles, tasteless, but slightly bitter in alcoholic solution, soluble in alcohol, ether, chloro-

form, very sparingly in benzin, insoluble in cold, but slightly so in boiling water. On adding a few drops of the alcoholic solution to water a turbidity was produced which disappeared on heating and reappeared on cooling, the substance separating after some hours in crystalline flocculi.

Concentrated sulphuric acid dissolved it with a dark red color, forming on dilution with water a purplish precipitate which was not taken up by chloroform.

Strong nitric acid dissolved it with a yellow color which changed to red on heating with evolution of red fumes of $NO_2$. The addition of an excess of water now produced a small amount of a yellowish-white precipitate, which with aqueous alkalies gave no color at first, but gradually dissolved turning red after some time.

In alcoholic solution the substance gave no reaction with ferric chloride. It was not dissolved by hot aqueous alkalies. It melted at 119° C., remaining after melting as an amorphous, transparent resin. Glacial acetic acid dissolved it very readily on warming, and subsequent dilution precipitated it unchanged. Digestion with dilute hydrochloric acid produced nothing capable of reducing alkaline copper solution. It burned with a smoky flame giving an aromatic odor slightly suggestive of coumarin.

Dry chlorine gas passed into the ethereal solution produced no precipitate. Evaporation of the ether left a soft amorphous residue insoluble in water, sparingly soluble in cold, more readily in hot alcohol, separating on cooling in amorphous, flocculent masses which on drying left a brittle resin melting to a thick viscid liquid at 90° to 95° C. The solution after heating with alkalies and saturating with nitric acid gave a precipitate of Ag Cl with silver nitrate.

A number of combustions were made with the following results:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| I, | ·1441 | gm. | substance | yielded | ·3281 | gm. | $CO_2$ | and ·0676 | gm. $H_2O$. |
| II, | ·1151 | " | " | | ·2864 | " | " | ·0541 | " " |
| III, | ·1212 | " | " | | ·3005 | " | " | ·0585 | " " |

Calculated to percentages this gave

| | I. | II. | III. |
|---|---|---|---|
| C, . . . . . | 67·73 | 67·86 | 67·62 |
| H, . . . . . | 5·21 | 5·22 | 5·36 |
| O, . . . . . | 27·06 | 26·92 | 27·02 |

| | Average. | Calculated for ($C_{20}H_{19}O_6$). | Calculated for ($C_{20}H_{22}O_9$). |
|---|---|---|---|
| C, | 67·74 | 67·63 | 67·67 |
| H, | 5·26 | 5·35 | 5·26 |
| O, | 27·00 | 27·02 | 27·07 |

This still left some doubt as to the formula, but as the amount of substance obtained was small, further experiments had to be postponed for the present. There can be no doubt that this substance is identical with that obtained by Colton.

PRINCIPLE FROM XANTHOXYLUM FRAXINEUM (LLOYD'S).

Comparison of the above-described substance with that presented by Lloyd (AM. J. PHARM., 1876, p. 226) and preserved in the museum of the college, disclosed a radical difference in crystalline form. Of the latter there were two specimens, one in comparatively large, somewhat tabular crystals, resembling in a measure potassium chlorate; the other, in the form of a light crystalline powder, identical with, but less pure than, the first, as was found upon further investigation.

A portion of the crystallized sample was further purified by the means above employed, *i. e.*, treatment with animal charcoal and recrystallization from hot alcohol. It was thus obtained in colorless crystals, smaller but of the same character as in the original sample, soluble in ether, chloroform and glacial acetic acid, from which it crystallized unchanged, insoluble in water or cold aqueous alkalies. Boiling aqueous alkalies decomposed it, dissolving it with a yellow color and saturation of this solution with dilute acid precipitated it as a light brown amorphous powder. In substance it is tasteless, but in alcoholic solution bitter and somewhat pungent. Digestion with dilute hydrochloric acid did not decompose it.

Concentrated sulphuric acid dissolved it with a light red color, appearing greenish-yellow in very thin layers. The addition of an excess of water to this solution produced a whitish precipitate which was taken up by chloroform and left as an amorphous residue upon evaporation of the solvent.

Strong nitric acid dissolved it with a deep red color and on dilution a bulky yellow precipitate was produced, soluble in alcohol, ether and chloroform, slightly soluble in water and easily in aqueous alkalies, forming blood-red solutions.

Dry chlorine gas passed into the ethereal solution precipitated a white crystalline powder, sparingly soluble in alcohol or ether.

Fusion with caustic potassa yielded formic, acetic, butyric and probably all the acids of the series as far as caproic. None of the aromatic class of bodies could be identified among the products.

The substance melted at 129·5° C. and resolidified to a crystalline mass at 123° to 125° C.

Combustion gave the following results:

I, ·1542 gm. of substance yielded ·3931 gm. $CO_2$ and ·0744 gm. $H_2O$.
II, ·2697 " " " ·6855 " " ·1279 " "
III, ·1186 " " " ·3010 " " ·0572 " "

In percentages:

| | I. | II. | III. |
|---|---|---|---|
| C, | 69·17 | 69·32 | 69·21 |
| H, | 5·36 | 5·27 | 5·36 |
| O, | 25·47 | 25·41 | 25·43 |

| | Average. | Calculated for ($C_{29}H_{27}O_8$). |
|---|---|---|
| C, | 69·23 | 69·18 |
| H, | 5·33 | 5·37 |
| O, | 25·44 | 25·45 |
| | 100·00 | 100·00 |

CHLORINE-DERIVATIVE.

Several grams of the purified crystals were dissolved in ether and dry chlorine gas passed into the solution until precipitation ceased. The crystalline powder so obtained was thoroughly washed with alcohol to free it from adherent chlorine and carefully dried over sulphuric acid. The ethereal liquid was shaken with water which after separation was found to contain hydrochloric acid. The ether on evaporation left a small amount of an amorphous residue which by treatment with alcohol yielded more of the crystalline product. The latter melted at 169·5° C., with evolution of hydrochloric acid.

To estimate the chlorine ·4524 gm. of substance was heated with pure calcium carbonate in a tube, dissolved in dilute nitric acid and precipitated with silver nitrate. This yielded ·4871 gm. of AgCl, equivalent to 26·63 per cent. of chlorine. Assuming that chlorine replaces an equal number of hydrogen atoms in the formula ($C_{29}H_{27}O_8$) this would indicate the replacement of five atoms (calculated 26·27 per cent. of Cl). To prove the correctness of this result a second estimation was made using sodium carbonate. ·3464 gm.

of substance yielded ·4127 gm. of AgCl equivalent to 26·59 per cent. of Cl.

NITRO-COMPOUND.

A portion of the substance was dissolved in strong nitric acid, taking care to prevent an undue rise of temperature, and the solution poured, while stirring, into an excess of water. The bulky, yellow precipitate so obtained was collected and washed with distilled water until but faintly acid, dissolved in dilute sodium hydrate solution, again liberated by saturation with dilute hydrochloric acid and shaken out with ether. Upon evaporation of the solvent it was left as an amorphous brown residue which was dried over sulphuric acid. The substance had no definite melting-point, but softened at about 85° C, and began to decompose above 100° C. It was somewhat hygroscopic and difficult to obtain completely dry. An estimation of nitrogen by Varrentrapp and Will's method yielded from ·3044 gm. of substance ·01501 of $NH_3$, equivalent to 4·06 per cent. of nitrogen. After drying for several hours at 70° C., ·3038 gm. yielded ·01673 of $NH_3$ or 4·53 per cent. of N.

A fresh portion of the original substance, heated with nitric acid and precipitated as before, gave a product of a brown color. After purification ·2513 gm. of this yielded ·01329 of $NH_3$ or 4 35 per cent. of N.

The percentage of nitrogen required for the formula $C_{29}H_{25}(NO_2)_2O_8$ is 4·73. It is, however, highly probable, more especially in the last instance, that the substance was otherwise oxidized and rendered to some extent acid in character.

CONCLUSION.

It appears then that the two substances obtained respectively from the northern and southern variety of prickly ash bark are not identical. They are probably allied compounds differing in constitution. By the use of Lloyd's process of preparation the same substance was obtained from Xanthox. carolinianum that had previously been obtained by the use of benzin. The northern variety could not be obtained in time to embody the results of its investigation in this paper, but further research upon this and also the alkaloid of prickly ash bark is in progress.

NOTE.—Since the above was written the bark of X. fraxineum has been under treatment and work has sufficiently progressed to prove

the identity of the crystalline principle extracted by petroleum ether with that obtained by Lloyd from the same species. They are alike in chemical and physical properties. Combustions of the last substance have as yet not been made. It was also noticed that the northern bark contains its peculiar principle much more abundantly than the southern.

The fixed oil obtained appears to be a sulphurated compound. A portion saponified with KOH and subsequently acidified with dilute HCl gave decided evidence of $H_2S$. Nitric acid acts energetically upon the oil, producing elaidin. The aqueous and acid filtrate from this gives a precipitate with barium chloride insoluble in nitric or hydrochloric acids.

## TANNIN OF QUERCUS ALBA.[1]

By Henry Kraemer, Ph.G.

One of the most abundant and interesting principles, produced during the life of numerous trees and herbs, and more especially in the barks and leaves of such, is a vegetable acid of astringent taste, giving blue or green compounds with salts of iron and by reason of its use, from many sources, in the process of making leather is called "tannin." The constitution of but one tannin, that of nut-galls is thus far understood. There are nevertheless several important classes of tannins recognized, based upon derivatives obtained from them; those which yield on dry sublimation either pyrogallic or pyrocatechuic acids; and those giving upon fusion with potassium hydroxide either protocatechuic acid or phloroglucol. Upon the suggestion of Prof. John M. Maisch, I have undertaken the study of the tannin of our officinal "White Oak Bark;" and to him I am indebted for references and many valuable suggestions in this work.

The preparation of a pure tannin is attended with considerable difficulty. The process which was found most practicable, was to macerate about 2½ kilos of Quercus alba with 95 per cent. of alcohol for a few days; then to pack in a percolator and allow per-

[1] This paper is an abstract of the chemical work reported in the author's thesis a year ago, to which, at the editor's request, some investigations more recently made have been added. The histological work, reported in the author's thesis, has not yet been arranged for publication.—Editor Amer. Jour. Phar.

colation to proceed only so long as the percolate showed a deep red-brown color. This concentrated alcoholic solution was distilled under reduced pressure to a volume of about 250 cc., the alcohol being further removed over sulphuric acid in a vacuum desiccator. This extract was then dissolved in tepid water and the solution filtered from a reddish-brown substance which remained undissolved; (but which redissolved readily in sodium hydrate or in alcohol) while to the filtrate additional water was added until no further precipitation occurred. The solution was again filtered and when perfectly clear surrounded with ice; when there separated an additional amount of the same reddish-brown substance as before and which indeed it is difficult to remove. The tannin was now precipitated from solution by means of sodium chloride. In previous experiments it was found that the amount of salt required to saturate the tannin solution was 0·3512 gm. for 1 cc. The sodium chloride, previously calculated, was divided into five equal parts and added in separate portions, slowly but with constant stirring to the solution, which was surrounded by a freezing mixture. In this manner five fractions of tannin were obtained. The original aqueous solution, before addition of sodium chloride, was of a dark red color as was also the first fraction of tannin. The solution as well as the succeeding fractions of tannin became lighter in color, the last being of a yellow color. Each one of the precipitated tannins was now separately dissolved in tepid water; filtered from some of the same reddish-brown substance as observed before, and water was added until precipitation ceased. The solutions were filtered and the tannins again precipitated with sodium chloride, but were immediately taken up by means of acetic ether. Between the aqueous and ethereal solutions there was suspended some of the same reddish-brown substance, a part of which adhered to the sides of the separatory funnel. The acetic ether was removed from the tannins in a vacuum desiccator over sulphuric acid. They were again separately taken up with tepid water and additional water added as before; also extracted with acetic ether and the ether removed as previously. By these repeated methods of purification five pure, though small, fractions of tannin were obtained. All of them at first dissolved in warm water, but in a short time, they all showed signs of having undergone more or less decomposition. The combustions made of the separate fractions showed considerable

variation, but the two fractions of which duplicates were made and which agreed most closely, gave of

| | | |
|---|---|---|
| C, | 58·74 | 59·65 |
| H, | 4·50 | 4·65 |
| O, | 36·76 | 35·70 |

These results correspond approximately to the formula $C_{29}H_{27}O_{13}$. Owing to this instability of the tannin of Quercus alba, it will be apparent that the results of combustions must vary and be rather unsatisfactory. In arriving at the constitution of this tannin, the solution probably lies in preparing acetyl or benzoyl derivatives and other stable compounds with it, some of which I hope shortly to be able to prepare.

The derivatives of this tannin are interesting, as they are not pyrogallic acid or phloroglucin, and hardly pyrocatechin or protocatechuic acid. A portion of the tannin was heated between two watch crystals, when a carbonized and tasteless mass remained; while upon the upper crystal there sublimed in needle-like crystals a light yellow compound, but sparingly soluble in water, the solution having a blue fluorescence; readily soluble in alcohol and in potassium hydrate, producing with the latter a red color which possessed an evanescent blue fluorescence. It resembled pyrocatechuic acid, in that it gave a dark green color with ferric chloride, which is turned slightly red by potassium hydrate and by hydrochloric acid the green is restored. It differs from this acid, in that it does not give a violet color to fir-wood, moistened with hydrochloric acid; also in that with calcium hydrate it produces a yellow color by transmitted light and a blue color by reflected light. In nitric acid it dissolves with a yellowish-red color, becoming deep red on addition of potassium hydrate.

Another portion was heated with nearly an equal weight of potassium hydrate in a silver crucible to a uniform state of fusion. The residue was dissolved in water, acidified with hydrochloric acid and then shaken with ether and the ethereal solution evaporated nearly to dryness. The result was a reddish-brown amorphous substance, producing a dirty mixture with water, and upon the addition of alkalies changing to a clear red solution, with a slight blue fluorescence. With ferric chloride it produced like protocatechuic acid a dark green color, which, upon addition of potassium hydrate, was immediately changed to a bright red color, but differed from this

acid in that this color was replaced by a yellow upon the addition of hydrochloric acid. A portion of the mass remaining from the ethereal solution deposited a slightly yellowish amorphous substance upon sublimation, producing with ferric chloride a deep red color. Another portion with ferric chloride gave a green color, which immediately changed to a yellowish-brown upon the addition of sodium bicarbonate, having a blue fluorescence.

A third portion of the tannin was heated at 100° C, with a 1 per cent. solution of hydrochloric acid for six hours in a sealed tube. A reddish-brown scaly substance separated (soluble in alkalies and in alcohol). The filtered clear yellow solution had a slight blue fluorescence. It was shaken up with ether and the ether removed by spontaneous evaporation. A light yellowish amorphous substance remained, having a bark-like odor, producing with sulphuric acid a greenish-yellow color, which became red upon warming, and on the addition of sodium hydrate, the color disappeared, but reappeared on adding a slight excess of alkali. If ammonia be used in this test, in addition to the above color, a decided fluorescence is observed. The aqueous solution was now deprived of ether by boiling, and then treated with Fehling's solution, which was reduced. A portion also gave with ferric chloride an olive green color; with acetate of lead a flocculent precipitate; with sodium hydrate a red brown color by transmitted light and a blue by reflected light.

The aqueous solution of the tannin of Quercus alba is light yellow in color; reddens blue litmus and gives also the following reactions:

With $Fe_2Cl_6$, an olive brown color possessing a slight fluorescence; in strong solutions a dark olive brown precipitate.
With alkalies, a deep red color, having also a decided blue fluorescence.
With Pb $(C_2H_3O_2)_2$, a flocculent precipitate (hardly white).
With $K_6Fe_2(CN)_{12} + NH_3$, a deep red color.
With $AgNO_3$, on application of heat, a reduction of metallic silver.
With Fehling's solution, on application of heat, a reduction of metallic copper.
With uranium acetate, a red brown precipitate, redissolving in acetic acid.

From these observations it will be seen that the tannin of Quercus alba yields upon sublimation a crystalline principle resembling somewhat pyrocatechin. Upon atmospheric oxidation it gives the insoluble red or phlobaphene; and upon fusing some of the tannin with potassium hydrate gives a phenol similar to protocatechuic acid.

The alkaline solutions of the tannin upon certain conditions possess a blue fluorescence. This fluorescent principle was per-

ceptibly present in the largest amount in bark recently collected, and but sparingly in many of the older commercial barks. That the material used in this research was undoubtedly that of the inner bark of Quercus alba, I feel quite sure of as this same reaction was observed in bark obtained in quantity from a reliable source and also in that collected by myself. Whether this fluorescence is a character of the tannin or a decomposition product of it, cannot from present work be accurately stated, and it is useless to fill up the gap by mere speculation; but given some time I hope to be able to throw some light upon the constitution and nature of this tannin.

## ON THE PRESENCE OF KINIC ACID IN THE LEAVES OF THE AMERICAN CRANBERRY (VACCINIUM MACROCARPON, *AITON*).

By Edo Claassen.

In Vol. 58, page 322, of this journal, it was stated that a calcium precipitate, prepared from the above leaves, was preserved for further examination in regard to the presence in it of kinic acid, and in the same volume also, on page 325, there was announced the preparation from this precipitate of a calcium salt in beautiful 6-sided plates. After having been prevented for a long time to continue the examination of these crystals, I could now commence the same again and consider their shape as well as their composition (*i. e.*, the amount in them of water and calcium)—and also their properties when treated by heat. As was already mentioned above, the crystals in question presented themselves as 6-sided plates, showing in their appearance no difference whatever from the forms of the calcium kinate, which are described to consist either of a combination of the much predominant basal plane o P with the orthorhombic prism $\infty$ P, or, as in this case, of the same combination and the planes $\infty \breve{P} \infty$, the last ones of course truncating the acute angles of the prisms, thus forming 6-sided plates, which are bounded by the same planes and have accordingly the same appearance like the crystals on hand.

The examination of these crystals in regard to their amount of water and calcium was then done as described below. Before entering, however, into any particulars, it may be stated that the crystals were kept for three years in a paper box and in a dry place, and consequently did have the best opportunity to lose some

water if liable to do so. It is a well-known fact, certainly, that calcium kinate crystals are efflorescent in dry air, as also that they are deprived of all their water—after having been exposed—for a sufficient time to a heat of 120° C., and, moreover, that a heat even of 200° C. will not decompose them. Considering this, 0·6132 grm. of the crystals to be examined were dried at 150° C., at which temperature they lost 0·1091 grm., representing the amount of water present, and left a residue of 0·5041 grm., the anhydrous calcium salt, without apparent change; this residue, ignited until perfectly white again, and then repeatedly and carefully heated with some water and ammonium carbonate, left 0·1191 grm. of calcium carbonate, corresponding to 0·0476 grm. of calcium. According to the above statement, the quantity of water of crystallization present amounted to 17·808 per cent., and that of calcium in the anhydrous salt to 9·451 per cent., while it is known that calcium kinate contains 29·900 per cent. water and the anhydrous salt 9·479 per cent. calcium. The analyzed salt lacks, therefore, considerably in regard to the amount of water, viz: 12·082 per cent., which loss may be easily explained by its having been exposed for the mentioned long time to dry air—and is, anyhow, in this case—of no importance, if it should not be claimed as a proof that the calcium salt in question is also possessed, like the kinate, of the property of effloresceing in dry air. In regard to the amount of calcium, however, in the anhydrous salt, it is of interest to note that there is hardly a difference existing between the quantity found in it and that calculated from pure calcium kinate, which difference, being but 0·028 per cent., is evidently not sufficient to raise any doubts as to the identity of that salt with calcium kinate.

Although, after having arrived at this point, a further test did not seem to be of value any more or necessary; it was resolved to continue the examination, in order to add to the chain of proofs the last link, if such one might possibly be thought by somebody to be yet missing. For this purpose I prepared from pure kinic acid some calcium kinate, with which I then made the following test, comparing the same carefully with reactions obtained under the same conditions, with an equal quantity of the calcium salt from Vaccinium macrocarpon, *Aiton*. The pure calcium kinate gave, heated in a tube, much water, then melted by increased heat,

swelled up considerably, and turned dark and grayish black, evolving fumes of a strong smell, which partly were condensed with the water, and thereby caused the same to acquire an acid reaction, a pungent taste and a brownish-yellow color. The salt in question was then subjected to the same test; the result was exactly the same. Further experiments, such as the preparation of kinone, were consequently now deemed entirely unnecessary for the corroboration of the fact, that the leaves of Vaccinium macrocarpon, *Aiton*, contain kinic acid.

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## RESIN OF PODOPHYLLUM AND PODOPHYLLIN.

By J. U. Lloyd, Cincinnati.

*Discovery.*—As early as 1831[1] Mr. Wm Hodgson made a partial analysis of the rhizoma of podophyllum, but overlooked the resin. In 1846[2] Dr. John King described a resinous substance then employed in his practice, identifying it as follows: "I obtain only the resin, by extracting all that alcohol will take up (by tincturing the drug), then filter the alcoholic tincture, to which add an equal quantity of water, and separate the alcohol by distillation—the resin sinks in the water."[3] In 1847,[4] Mr. J. R. Lewis made a good analysis of the drug, describing the resins and stating that six or eight grains had been taken as an experiment, operating as a drastic cathartic accompanied by vomiting. Thus it is evident that King (1844) and Lewis (1847) independently wrote upon the subject, both referred to the substance under consideration, which King had used for some years preceding his published paper, and both of them called the substance a resin. If Mr. Lewis was acquainted with the recorded statements of Prof. King, he neglected to refer to them, and it is probable that he was unaware of their existence. From that early day Prof. King energetically and continuously held this resin before his classes, and in his writings advocated the use of resin of podophyllum as the Eclectic substitute for calomel. It became thereby

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[1] Am. Journ. Pharm., January, 1832, p. 273.

[2] *Western Medical Reformer*, April, 1846, p. 176.

[3] Preceding this, Prof. King referred to the resin in the *Philosophical Medical Journal*, of New York, 1844. Vol. 1, p. 160.

[4] Am. Journ. Pharm., August, 1847, p. 169.

firmly identified as an Eclectic remedy long before the Regular[1] section recognized its value. In connection with this phase of the subject we find that the *United States Dispensatory*, preceding its tenth (1854) edition referred only to the analysis of Mr. Lewis. In that edition mention is also made of the notice Mr. Manlius Smith gave the resin in the AMERICAN JOURNAL OF PHARMACY, 1852. In the eleventh edition (1858) the first reference is made to its then common name in commerce, as follows: "It is called *podophyllin*," but it was not commended as a therapeutical agent. In the twelfth edition (1865), the resin having become officinal in 1860, a creditable notice is given the substance. In contradistinction, the first edition of the *Eclectic Dispensatory*, King and Newton, 1852, devotes seven pages to this drug.

In an early publication[2] Prof. King stated that "My introduction to its therapeutical action having been of a serious character," at the solicitation of the writer contributed the following interesting communication connected with the discovery and introduction of this important drug:

*Cincinnati, June 14, 1887.*

PROF. JOHN U. LLOYD,

*Dear Sir:*

In answer to your request, I will state that my discovery of podophyllin was by no means a pleasing incident, and I will relate it to you as briefly as possible. In the fall of 1835, desiring to make a hydroalcoholic extract of mandrake root (with the aid of potassa during evaporation), the tincture of the root, and its subsequently made infusion, were mixed together. In order to save as much of the alcohol as possible, this mixture was placed in a distilling apparatus, and when about one-third of the alcohol had been collected, by the distillation, the operation was discontinued on account of approaching night. Upon opening the kettle the next morning, and stirring up the now cold mixture, previous to a reapplication of heat and continuation of the distillation, a peculiar substance was found deposited in it, which I at first thought from its appearance was some foreign material that had found its way into the liquid

[1] I use this term as applied to the dominant section of American Physicians, because their members seem as a rule to prefer it to Allopathic. The term "Irregular" I do not consider opprobrious as applied to those of the minority.

[2] *The College Journal of Medical Science*, Cincinnati, 1857, p. 557.

and become burnt, or injured by the heat during the distillation of the previous day. While pondering over the matter, and still undetermined as to the nature of this deposit, I decided to investigate its action as a purgative, and accordingly administered about twelve grains to a patient, not supposing it to have much of any medicinal action. But I was soon brought to know the reverse. In an hour or two after having taken it, the lady was attacked with hypercatharsis and excessive vomitings, which continued for two or three hours before I was notified. I was truly alarmed at her condition, fully recognized the nature and remedial power of the resin, as well as my responsibility in having permitted her to take a substance concerning the action of which I knew nothing. It was a serious lesson to me which I have never forgotten.

I found her in severe pain and distress, cramps in the stomach and extremities, with coldness, and slight lividity of the surface, pulse small and weak, almost incessant vomiting and purging, her condition greatly resembling that of one in the latter stage of a fatal attack of Asiatic cholera—she was apparently sinking rapidly. It is unnecessary to occupy time and space with the treatment pursued, suffice it to state that by a careful and persistent course of medication and nursing for three or four days, she recovered; but, unfortunately, was left with a chronic malady of the digestive organs, which, as far as I know, was never removed.

These serious effects, together with many unpleasant surroundings at the time naturally associated with the event, produced a very unfavorable impression concerning the resin, and several years passed before I mustered courage to try it again in smaller doses, and which attempt was greatly owing to a conversation with Prof. W. Tully, M.D., of Yale College, New Haven, Conn., who, upon having related to him my fearful initiation in the use and action of resin of podophyllum, advised me to test it in much smaller doses; during this conversation he informed me that Cimicifuga likewise contained a resin, and which I subsequently succeeded in obtaining. After having successfully tested podophyllum resin in several varieties of disease, I called attention to it in *The Philosophical Medical Journal*, of New York, vol. i, p. 160, 1844, and subsequently, in connection with other preparations, in *The Western Medical Reformer*, of Cincinnati, vol. v, pp. 175, 176, 1846. About a year after this latter publication, being in the drug store of the

late Mr. W. S. Merrell, at that time located on the N. W. corner of Court and Plum Streets, Cincinnati, O., he called my attention to two samples, one of podophyllum resin, the other of cimicifuga resin, about an ounce or so of each, which he said were made according to my directions in *The Western Medical Journal*, and inquired if they were anything like those I had produced. I answered him that they were, and questioned him whether the Eclectic physicians of Cincinnati had tried them. He stated in reply that he had not been able to prevail upon them to prescribe them. According to promise given to Mr. Merrell, I shortly afterward gave Prof. T. V. Morrow, M.D., a few hints as to the value of these resins, and it was not long before communications appeared from the pens of Prof. Morrow, Hill, and others, in which the remedial virtues of these agents were highly lauded, from which time resin of podophyllum, more especially, has been extensively employed by all classes of physicians.

Yours truly,

JOHN KING, M.D.

From a careful review of the literature, and from an intimate acquaintance with those connected with the introduction and discovery of the substance, I feel that without a question the foregoing comprises the facts in justice to all concerned.

[*To be continued.*]

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## PODOPHYLLIN EMODI.

BY F. A. THOMPSON, Ph.G.

In the Pharm. Journal and Transactions, Jan. 26, 1889, page 585, Messrs. Dymock and Hooper state "that the genus Podophyllum contains only two species, one Himalayan and the other American.[1] The former, *P. Emodi*, Wallich, inhabits shady valleys on the inner range of the Himalaya and is very abundant in Kunawur and Cashmere. The root agrees in most particulars with that of *P. peltatum*, but differs in the intervals of the knots whence aërial stems are given off, the knots being more frequent in this species. They state that the sample examined by them yielded 12 per cent. of amorphous resins, of a pale orange-brown, soluble in alcohol, ether, chloroform

[1] According to the same authors, in Pharmacographia Indica, I, p. 69, two additional species of Podophyllum are found in China.—Editor AM. JOUR. PHAR.

and almost entirely so in ammonia, and upon ignition left no residue; and that when given in doses of ½ grain it produced slight griping sensation not uncommon to podophyllin when administered by itself."

From the large yield of resin, similar to podophyllin in physiological action, this drug seems worthy of further investigation, and thus I am prompted to make known my limited experience with the resin, made from P. Emodi.

A sample was placed in my hands with the request to compare it with podophyllin, as to amount of active principle, podophyllotoxin, it contained. My sample was small, weighing less than 3 grammes, and a portion of a small lot made in Bombay from a few of the roots, which yielded in this case 9 per cent. resin. Upon incineration it left no ash and dried at 100° C. till constant weight, lost 4·2 per cent. moisture.

Two grammes treated with benzin extracted 0·080 cm. of oily and waxy matter. The drugs were exhausted with chloroform, the chloroform percolate evaporated on a steam bath to a small volume, and then gradually poured into 30 cc. of ether. The ethereal fluid was decanted from the agglutinated precipitate, which was washed with several portions of ether, and the total ethereal solutions evaporated, and the residue, amounting to 0·261 gramme, weighed as *podophyllotoxic acid.* The precipitate of *podophyllotoxin,* was dried on a steam bath to a constant weight of 1·131 grammes.

RECAPITULATION OF ANALYSIS.

| | Per Cent. |
|---|---|
| Ash, | none. |
| Moisture, | 4·2 |
| Oily and waxy matter, soluble in benzin, | 4·0 |
| Podophyllotoxic acid, | 13·1 |
| Podophyllotoxin, active principle, | 56·55 |
| Inert matter, insol. in chloroform and sol. in alcohol, | 22.15 |
| | 100·0 |

The percentage of active principle, podophyllotoxin, in this sample is fully 25 per cent. higher than the average amount found in resin of podophyllum, which varies from 40 to 45 per cent. American podophyllum yields on a large manufacturing scale, 5 per cent. of podophyllin, and accepting 10 per cent. as a practical average from the Indian, we would have a drug worth 2½ times in value.

The literature regarding P. Emodi is limited, and therefore it is impossible to state whether this drug is sufficiently abundant to gather, even at a much higher value than mandrake root; but it is hoped that we may have more than one source of this resin.

DETROIT, MICH., April 22, 1890.

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## GLEANINGS FROM THE GERMAN JOURNALS.

BY FRANK X. MOERK, Ph.G.

*Orexin* is the name given by Prof. F. Penzoldt to phenyldihydrochinazolin hydrochlorate, which was found to be a true stomachic not only creating an appetite, but also assisting the digestion of foods. This action of orexin was not deduced from its formula, but was discovered in studying its effects upon the human system; the remedy apparently acts by producing local irritation and is best prescribed in gelatin-coated pills, as follows: Orexin hydrochlor., 2·0; extract. gentianæ, and pulv. rad. althææ āā q. s. M. f. pilulæ No. 20. D. S. 3–5 pills to be taken once or twice daily with a cup of beef tea.—*Pharm. Ztg.*, 1890, 115.

*The detection of nitrobenzol or oil of mirbane* in oil of bitter almonds succeeds easily by warming the suspected oil with black oxide of manganese and sulphuric acid. Nitrobenzol does not lose its odor by this treatment, on the contrary, the odor becomes more pronounced, after standing for awhile an odor of oil of cinnamon is developed; oil of bitter almonds at first develops a disagreeable odor which, after some time, entirely disappears.

To detect nitrobenzol in soaps, solutions, etc., soaps are first dissolved in water; the solutions are treated with an excess of slaked lime, extracted with ether, the ethereal solution evaporated to dryness on a water bath and the residue shaken up with a little water. In a small porcelain capsule are placed two drops liquefied carbolic acid (made by adding 10 parts water to 100 parts of the crystallized acid), three drops distilled water and a piece of potassium hydrate of the size of a pea. This mixture is heated to the boiling point, care being taken to prevent charring of the mass, and a few drops of the ethereal residue mixture added; on continued boiling a carmine-red ring is formed around the edge of the liquid, the depth of color depending upon the quantity of nitrobenzol present; the

addition of calcium hypochlorite solution changes the red into a beautiful green color.—J. Morpurgo, *Pharm. Post*, 1890, 258.

*Chloroform in ethyl bromide.*—In the preparation of the latter chemical from potassium bromide, alcohol and sulphuric acid, the product always contains ether which cannot be removed in the rectification, and which will give a preparation of low specific gravity. To overcome the low gravity it is not unlikely that chloroform may be added until the correct gravity is obtained; such an addition could only be detected by chemical means, and here the simplest test depends upon the isonitril reaction: A few cc. of the sample with an equal volume of strong sodium or potassium hydrate solution and one drop of aniline are agitated in a test tube; the application of a little heat should develop no odor differing from the cold mixture. Bromide of ethyl with 1 per cent. of chloroform gave immediately the offensive odor of carbylamine. This same test allows of the ready distinguishing between chloroform and ethyl bromide.—Dr. L. Scholvien, *Pharm. Ztg.*, 1890, 138.

*Boroglycerin-Cream.*—1·0 boric acid is dissolved with the aid of heat in 24·0 glycerin and allowed to cool. 5·0 anhydrous lanolin and 70·0 paraffin ointment are melted together, colored by addition of 0·01 alkannin, the boroglycerin added, stirred to creamy consistence and perfumed with one drop each of oils of rose and bergamot. —E. Dieterich, *Pharm. Centralhalle*, 1890, 158.

*Diachylon Wound Powder.*—5·0 lead plaster and 2·0 yellow wax with 20·0 ether are agitated in a flask until solution or perfect disintegration of the lead plaster results. 45·0 wheat starch, 45·0 talcum and 3·0 boric acid, all in very fine powder, are mixed in a mortar, then the ethereal solution added, perfumed with one drop each of the oils of wintergreen and bergamot and exposed on parchment paper at ordinary temperature until the volatilization of the ether. This powder is valuable as a dusting powder in chafing, sore feet, etc.—E. Dieterich, *Pharm. Centralhalle*, 1890, 158.

*Lanolin Dusting Powder.*—5·0 anhydrous lanolin are dissolved in 20·0 ether and rubbed up with 45·0 wheat starch; by exposure the ether is allowed to evaporate. 2·0 powdered boric acid and 50·0 powdered talc are mixed with the lanolin starch powder and flavored by the addition of one drop each of oil of wintergreen and oleo-balsamic mixture.—E. Dieterich, *Pharm. Centralhalle*, 1890, 159.

*Syrup of Coffee.*—200·0 finely ground coffee are moistened with

250·0 distilled water and 50·0 spirit of cognac and then 800·0 boiling simple syrup added; the vessel is covered, set aside for 15 minutes in a moderately warm place, and after standing at ordinary temperature for 24 hours, the liquid is filtered. This formula gives a superior product, if the directions are followed closely.—E. Dieterich, *Pharm. Centralhalle*, 1890, 160.

*Adhesive masses for plasters*, intended to increase the adhering property of plasters, may be made with rubber or gutta-percha as the base. *Massa emplastica cummea.*—10 parts rubber, in fine shreds, are added to a melted mixture of 25 parts anhydrous lanolin and 25 parts resin, stirring with an iron spatula and heating moderately at first, afterwards to 180–200° C., until the rubber is completely dissolved; 25 parts resin and 10 parts dammar resin are now added, and heat is applied until a homogeneous mixture is obtained, which is poured into porcelain vessels and set aside for use. *Massa emplastica perchata* differs from the other mass only in having gutta-percha instead of rubber. The gutta-percha is softened by kneading under hot water, drawn out into thin ribbons, and cut into shreds before adding it to the melted lanolin and resin. The addition of 25 per cent. of these masses to the regular plaster mass will cause the plaster to adhere to the body for weeks; should the plaster contain mineral oils, 30 per cent. of the adhesive masses should be added. The anhydrous lanolin is of especial value in absorbing the moisture eliminated by the body, so maintaining the adhesive property of the plaster.—H. Hager, *Pharm. Ztg.*, 1890, 108.

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## MINUTES OF THE COLLEGE MEETING.

PHILADELPHIA, March 31, 1890.

A stated meeting of members of the College was held this day at 3½ o'clock, P.M., Charles Bullock presiding. There being no quorum at the previous meeting in December and no business transacted, the minute of the meeting in September was now read and on motion adopted. The minutes of the meetings of the Board of Trustees for October, November and December, 1889, and of January, February and March, 1890, were also read and on motion approved. This being the annual meeting, the reports of officers and committees were called.

The Editor, Prof. J. M. Maisch, submitted the following: "During the past year the JOURNAL published sixty-four original papers, of which thirty-seven were contributed by thirteen members of the College, while twelve papers were furnished by ten authors who are not members. The remaining fifteen papers consisted of abstracts from forty-five theses. Eighteen of the papers had

been read at meetings of the College, and for twenty, including a number of theses, the investigations had been performed in the chemical laboratory of the College. Besides these papers, a large number of original translations, including gleanings and abstracts from European papers, were published—also editorials, reviews and other matter prepared by the Editor, and essays selected from other journals. It appears to the Editor that during the past year the pharmaceutical meetings have not been as well attended by the members of the College as their interests and usefulness would seem to suggest."

The report of the Business Editor was presented; likewise the report of the Chairman of the Committee on Publication, which contained the following statement, among others:

"The JOURNAL has been issued with regularity and promptness, and its character as an exponent of scientific and practical pharmacy and chemistry maintained. As foreshadowed in previous reports, the Committee still find it difficult for reasons stated to extend its circulation and advertising patronage as much as they could wish, but believe that, under the circumstances that prevail, they are doing as well as possible."

On motion of Mr. Webb $500 were appropriated by the College on account of the bill presented by the Publishing Committee.

The Librarian in his annual report states that "several very valuable works have been added to the Library—among these the Repertorium of Buchner (110 volumes), a gift from Prof. Maisch—also some valuable documents from the Government Printing Bureau, through F. W. Leach, Esq."

Mr. Joseph W. England, the Curator of the College, reports—"The Museum is in good condition—valuable accessions having been received during the year. Its value, as a medium of reference to the student, is becoming more apparent. To facilitate its usefulness it is requested that a wooden case, containing blank cards (similar to that used in the Library), be provided—this to be used for indexing the museum contents, in addition to the present index. Students are given ample opportunity to inspect the collection during the lecture season."

Prof. Remington moved that the Curator's request for index cards be referred to the Committee on Property, with power to act. The motion was carried.

A communication was received from Dr. L. Wolff, member of the College, tendering his resignation and requesting to be permitted to retain his certificate. His resignation was accepted, and his request granted.

Reference was made to the death of Walter T. Baker, formerly a member of this College, and the subject referred to the Committee on Deceased Members.

The election of officers and trustees being next in business order, resulted as follows:

President—Charles Bullock.

Vice-Presidents—Robert Shoemaker, William J. Jenks.

Treasurer—William B. Webb.

Corresponding Secretary—Dr. A. W. Miller.

Recording Secretary—William B. Thompson.

Librarian—Thomas S. Wiegand.

Curator—Joseph W. England.

Committee on Publication—Henry N. Rittenhouse, Chairman; James T. Shinn, Chas. Bullock, Thos. S. Wiegand, J. M. Maisch, Editor.

Editor—Prof. John M. Maisch.

Trustees for 3 years—T. Morris Perot, J. P. Remington and James T. Shinn.

A motion to elect delegates to represent this College at the meeting of the Penn. Pharm. Assoc., to be held at York, in June next, resulted as follows: Dr. Clement B. Lowe, Wallace Procter, Alonzo Robbins, John M. Maisch, Joseph P. Remington.

On motion adjourned. W. B. THOMPSON, *Secretary.*

## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, April 22, 1890.

On motion of Mr. E. M. Boring, Wm. B. Webb, Ph.M., was called to preside. The minutes of the last meeting were read, and no corrections being required, they stand approved.

Two quarto volumes of the second and third sections of the report of the Fisheries Industries of the United States, for the year 1880, were presented by the department for the library. There was also received part II of the Pharmacographia Indica, by W. Dymock, C. J. H. Warden and David Hooper, and a pamphlet in the Spanish language on Diálisis química, by Alfonso L. Herrera.

A letter was read announcing the presentation of ten cases of Materia Medica Specimens from Messrs. Parke, Davis & Co., which the actuary was directed to acknowledge with thanks when they shall have been received, and to report also to the Board of Trustees.

A paper upon *Xanthoxylum fraxineum*, by Prof. J. U. Lloyd, of Cincinnati, was read by Prof. Trimble; also a paper on crystalline principles of *prickly ash bark*, by E. G. Eberhardt. The papers were accompanied by crystalline principles, prepared by Mr. Lloyd, and other samples with several derivatives, prepared by Mr. Eberhardt; the latter is still engaged with the further investigation of these principles. Prof. Maisch said he was anxious to obtain flowers, leaves and bark of the southern varieties of prickly ash which seem to be peculiar to Florida.

A paper upon Standardization of drugs was read by Mr. G. M. Beringer, Ph.G., which was listened to with great attention. Prof. Maisch read some paragraphs from the Ephemeris of Dr. Squibb, and closed with a paper treating upon the same subject.

A member remarked that whatever the weight of evidence on some points might be, he felt that Standardization was a move in a proper direction, it greater uniformity in the strength of medicines could be secured thereby. The further discussion on this subject related to the natural variations in the composition of plant products, grown under identical and under different conditions; to the identification and estimation of constituents of similar chemical character, but differing in physiological action; to the quality of drugs agreeing with pharmacopœial descriptions, and to allied subjects. It was then suggested that, owing to the late hour, further discussion be discontinued for the present, and that after reading all the papers on the subject in the forthcoming journal, and also others, members might be prepared to renew discussion on this important subject at the next pharmaceutical meeting, to be held on the third Tuesday in May.

There being no further business, on motion, adjourned.

T. S. WIEGAND,
*Registrar.*

# PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

*Philadelphia College of Pharmacy.*—The past session was the first one covering the extended term, that of the junior class having been lengthened from 4½ to 5¼ months, and the senior class from 5 to 6 months. The *junior examinations* were held November 9th, December 14th and March 8th, the questions in the different branches being as follows:

BOTANY AND MATERIA MEDICA.

(1) Describe the conditions for the formation of a cell. What are the contents of a newly-formed cell? What is the original shape of a cell, and from what influences is this shape subsequently altered? Name and briefly describe the appearance of some of the cell contents having a definite shape.

(2) Give a full explanation of the manner in which you would write out an intelligent description of an expanded part of a plant, like a leaf. Name and explain some of the descriptive botanical terms for expanded parts of plants.

(3) Describe and illustrate by sketches the following: Fibrovascular bundle of monocotyledonous stems; Fibrovascular bundle of dicotyledonous stems; Palisade layer; Stoma.

(4) Explain the following: Acaulescent herb; Shrub; Rhizome; Bulb. Give also one or two examples for each of the above.

(5) *Cloves:* Give the botanical name of the plant yielding cloves. What part of the plant is used? Describe the officinal article, giving the characteristics of calyx, corolla, andrœcium and gynæcium. Name the most important proximate principles of the drug and state the percentage of each. Name some other drugs obtained from the same natural order.

(6) Explain the structure (number of carpel-leaves, placentation, dehiscence) of the following *fruits*, and give one or more examples of each kind: Akene, Follicle, Legume, Silique. By what characteristics may a *seed* be distinguished from a fruit?

THEORY AND PRACTICE OF PHARMACY.

(1) Describe specific gravity bottles. By what name are they now known? What are they used for? How is a specific gravity bottle used for liquids? How is a specific gravity bottle used for solids? Describe and illustrate by a drawing a hydrometer.

(2) Explain the difference between an illuminating gas flame and one used solely for heating purposes. How may the former be converted into the latter?

(3) Define the terms cubic centimetre, gramme, litre, kilogramme, milligramme and centimetre. Give their equivalents in apothecaries' weight and measure. What is the specific gravity of a liquid, of which one pound avoirdupois will measure one pint?

(4) Define Desiccation as used in Pharmacy, state its objects and describe the apparatus used in the process. Define Deliquescence and Effloresence; name two substances which are liable to deliquesce or effloresce, and state how deliquescence or efflorescence may be prevented.

(5) Describe the principle of action of the process of percolation. What is repercolation, and to what class of preparations is it especially adapted?

(6) Describe the officinal process for making oxide of zinc. What difference is there in the appearance of the officinal and commercial oxides? How is ointment of oxide of zinc made?

CHEMISTRY.

(1) Upon what principle do we base the composition of "freezing mixtures?" Give the composition of one or more such mixtures, showing how they illustrate the principle before stated.

(2) State the distinction between a native magnet, an artificial maguet, and an electro-magnet. Which of these classes is the most powerful in its action? Mention any useful application any of these classes have in practice.

(3) What is *Aqua Chlori?* How is it made—from what materials and with what form of apparatus? What are the uses of *Aqua Chlori?*

(4) Describe the element *Iodine* and state whence it is obtained. Give the formulas of three compounds of iodine and metals. State some of the pharmaceutical preparations in which iodine is the essential constituent.

(5) Give the chemical formulas of the several phosphoric acids and state their basicity. Write the formulas of the sodium salts of these several acids. Give the chemical formula of an officinal hypophosphite.

(6) Complete the following reactions, and name the several substances used in the reaction and the products obtained.

$$CaOCl_2+2HCl=$$
$$Na_2S_2O_3+H_2SO_4=$$
$$2NaHCO_3+heat=$$

QUESTIONS BY EXAMINING COMMITTEE.

(1) Name ten of the classes into which the preparations of the United States Pharmacopœia are divided. Write the correct Latin officinal name of one preparation from each, immediately after the title of the class to which it belongs.

(2) How does the *venation* of monocotyledonous and dicotyledonous plants differ? How do *pinnate* and *palmate* leaves differ? Illustrate by diagram, the following forms of leaves: *Ovate, Lanceolate, Sagittate, Peltate.*

(3) State the weight in grammes of the quinine contained in one litre of fluid extract of cinchona, U. S. P., if the bark from which it was made yielded 2·75 per cent. of the alkaloid and was thoroughly exhausted.

(4) Name the ingredients and proportions of each, which enter into the composition of *Seidlitz Powder.* What is its officinal name? What reaction takes place when they are mixed? How should it be kept in stock? What is the result of improper keeping?

(5) How is *nitro-hydrochloric acid* made by the officinal process? What should be produced by the reaction? What is the synonym of this acid? How is *diluted nitro-hydrochloric acid* made? State its medicinal properties and dose.

SPECIMENS.

| | | |
|---|---|---|
| Chelidonium. | Aqua Amygdalæ amaræ. | Acidum sulphurosum. |
| Aurantii flores. | Mistura Ferri et Ammo- | Potassii nitras. |
| Chondrus. | nii acet. | Sodii boras. |
| | Syrupus Tolutanus. | |
| | Ferri sulphas præcipitatus. | |

In Operative Pharmacy each student was required:

(1) To prepare two fluid ounces of syrup of iodide of iron.

(2) To dispense twelve powders, each containing Cinchoninæ sulph., gr. v, and Glycyrrhizæ pulv. gr. iij.

(3) To percolate 4 oz. of ground glycyrrhiza with a mixture of one fluid ounce of water of ammonia and one pint of water.

The examination of the senior students commenced March 29 and terminated April 3. The questions in the different branches were as follows:

MATERIA MEDICA AND BOTANY.

*A—Gentian Root*—Give the botanical name of the plant and its habitat. Describe the drug, including its structural characteristics. Name and briefly characterize the important principles of the drug. What effect will be produced upon the tincture or cooled decoction of gentian, *a* by ferric chloride and *b* by solution of iodine? Explain the reactions produced by the reagents just named. What other drugs are obtained from the order of Gentianaceæ? Name the characteristic principles present in these drugs.

*B—Jalapa*—Give the botanical name and the habitat of the plant. Describe the drug and explain its structure. Name its constituents, and give the percentage of the most active medicinal principle. What effect have simple solvents upon this principle? Explain its behavior to alkalies. What is the medicinal dose of jalap and of resin of jalap? In which of its chemical properties does resin of scammony resemble resin of jalap, and how may the two be distinguished?

*C—Bittersweet*—Name the plant, its habitat and the part officinal. At what season should the drug be collected? Give a description of the drug and of its structure. Name the important proximate principles of bittersweet, and state the medical properties and dose of the drug. Name two officinal alkaloids or alkaloidal salts procured from the same natural order to which the bittersweet plant belongs. State the reaction by which these alkaloids may be best distinguished.

*D—Prickly Ash*—Name the plants from which this bark is procured; also their habitat, and the natural order to which the plants belong. Describe the bark, including it structure. By what characteristics may the two principal commercial varieties of prickly ash bark be distinguished? What other bark has been confounded with prickly ash, and how does it differ from the officinal bark? Name the important proximate principles of prickly ash, and state its medical properties and dose. Name other drugs obtained from the same natural order.

*E—Senna Leaves*—Give some of the botanical characteristics of the section *Senna*, genus *Cassia*. Point out from which of these characters the plant yielding the so-called American senna differs. Name the commercial varieties of officinal senna. Give for each variety the botanical name of the plant yielding it. Describe the characteristics of the commercial varieties of senna, and give for each variety the admixtures or adulterations sometimes met with, and the characters by which these may be recognized. Name, and briefly characterize the more important proximate principles of Senna. What effect upon Senna leaves has each of the following solvents: Alcohol, diluted alcohol and boiling water?

*F—Labiatæ*—Give the botanical names of the plants of the order of Labiatæ yielding officinal herbs, leaves or flowers. State in each case which part is directed by the Pharmacopœia? Its medical properties, and dose, and whether the medical properties reside mainly in volatile oil or in bitter principle. Give

some of the properties (specific gravity, solubility, taste,) of the officinal oils of Labiatæ. Name two stearoptens procured from this natural order; also the plants yielding the same, and give the characteristic properties of these stearoptens.

*G—Cardamom*—Give the name of the plant yielding Cardamom, its natural order and its habitat. Which part of the plant is officinal? When is it collected? Describe the drug, including its structure. Name the proximate principles present, giving the percentage of the more important constituents. Give the medical properties and dose. Which part of the drug is rejected in preparing "aromatic powder," and for what reason? What percentage of the weight of the drug is the rejected part?

*H—Stavesacre*—What is Stavesacre? Name the plant and give its habitat. Describe the drug, including its structure. What are its medical properties and uses? What alkaloids does the drug contain? Name three other drugs derived from the same natural order, and give for each the medical properties, dose and the medicinally active principle.

*I—Opium*—From what tissue of the poppy capsule is Opium obtained? and how is it prepared? By what physical characters may the quality of good opium be determined? Give the outlines of the pharmacopœial test for ascertaining, chemically, the quality of opium. Which principles, commonly found in plants, are absent from opium? Describe a characteristic reaction of the acid peculiar to opium. Give the average adult dose of opium, of morphine and of codeine. What antidotes are indicated in cases of poisoning by opium?

*K*—What is the average composition of *cow's milk?* Which plants contain the alkaloid *sanguinarine?* Name the poisonous principle of certain *Ericaceæ;* also name some of the plants containing this principle, and other ericaceous leaves which are free from it. Give the characteristic chemical reactions of *gallotannic acid.* Give the characteristic color reactions of *strychnine* and *brucine.*

THEORY AND PRACTICE OF PHARMACY.

*A*—How many fluid ounces of *water* must be added to a pint of *solution of chloride of iron* (sp. gr. 1·405 containing *37·8 per cent.* of anhydrous salt) to make the solution contain *10 per cent.* of anhydrous salt? If officinal *solution of tersulphate of iron* contains *28·7 per cent.* of normal ferric sulphate, how many *grains* will be found in *one pint?*

*B*—Give the unabbreviated officinal names, ingredients, brief outline of process, and describe the appearance of *Donovan's Solution, Fluid Extract of Squill, Syrup of Hypophosphites, Infusion of Digitalis, Extract of Taraxacum, Glyconin, Tincture of Musk, Chalk Mixture.*

*C*—Give the English name or synonym, ingredients, brief outline of process, and describe the appearance of *Mistura Ferri Composita, Pulvis Rhei Compositus, Syrupus, Unguentum Hydrargyri Nitratis, Tinctura Lavandulæ Composita, Vinum Ergotæ, Emplastrum Capsici, Spiritus Ætheris Compositus.*

*D*—What is *Malt?* Describe the process, with the precautions necessary for obtaining it; explain the various changes which take place in the substance from which it is made. Name an officinal preparation of malt. What valuable ferment does it contain? Give a brief process for the officinal preparation.

*E*—Give the principle tests of identity for *Morphine, Aconitine, Quinine, Coniine, Colchicine.*

*F*—To what class of proximate principles does *Camphor* belong? State how it is obtained, and how it is refined. What action has camphor upon resinous substances? Name five *good* solvents for camphor and two *poor* solvents for it. How would you compound the following prescriptions?

℞
Camphoræ, gr. xx
Syr. Zingib. f ℥i
Aquæ Camph., f ℥iij
Misce sec. art.
Sig. A teaspoonful when required.

℞
Camphoræ, gr. xx
Chloral., gr. xv
M. ft. pil. No. xxx
Sig. One at night.

*G*—Describe the method of making tablet-triturates. How do these differ from tablet-saturates? What advantages or disadvantages do these tablets possess over similar methods of medication? How are compressed pills made? What are their advantages and disadvantages?

*H*—What addition or manipulation could be suggested for each of the following prescriptions, which would not interfere with their medicinal effect and yet improve their appearance or facilitate their dispensing?

℞
Sodii Salicyl., gr. xxx
Spt. Æther. Nit., ♏ xxx
Aquæ, f ℥ij

℞
Argenti Oxid., gr. xii
Creasoti, gtt. x
M. ft. pil. No. xij

*I*—Examine the following prescriptions and if you would dispense them, state the proper method, writing the names in English of each ingredient, explaining the difficulties if any exist, and give the quantity of the finished preparation in each case.

℞
Syr. Acaciæ ℥iij
Tr. Card. comp. gr. xvi
Quin. Sulph. ℥i
M. S. a tablespoonful three times a day.

℞
Potass. chlorat. ℥i
Aquæ bull. ℥i
Solut. Morph. ℥i
Syr. Tolu ℥ij
M.

℞
Extr. Secal. corn. fl. f ℥i
Vini ejusd. f ℥i
Sacch. alb. ℥ss
M. S. a teaspoonful every 2 or 4 hours as needed.

*K*—State whether it is proper to filter the following prescriptions, and whether their appearance would be improved by filtration; give the reasons for your judgment and indicate the correct procedure:

℞
Potassii Iodidi, ℥i
Tr. Guaiaci Amm., f ℥ss
Vin. Colch. Rad. f ℥i
Aq. Menth. Pip. q. s. ad f ℥iij
M. Sig. Half a teaspoonful after meals.

℞
Potassii Bromidi, ℥iij
Syr. Chloral, f ℥ij
Aq. Fœniculi, q. s. ad f ℥ij
Sig. A teaspoonful at bed-time.

℞

Hydrarg. Chlor. Mit., ʒi
Liq. Calcis, fʒiv
Sig. Apply morning and evening.

CHEMISTRY.

*A*—Write the chemical reactions for the preparation of pure Carbonate of Soda by the Leblanc process, naming all the products. Do the same for the "Ammonia-Soda" process. Do the same for the Cryolite process.

*B*—What is the composition of Sal-Ammoniac? Of *Ammonii Carbonas?* Of *Ammonii Nitras?* Of *Ammonii Sulphas?* Of *Ammonii Phosphas?* Write the chemical reaction for the decomposition of Sal-Ammoniac by quicklime—for the decomposition of Ammonium Nitrate by heat.

*C*—Describe the metal Aluminum. Give an outline of the more important processes for its manufacture. Mention any important uses of the metal or its alloys.

*D*—Write the chemical formulas for the following officinal salts of iron: Chloride, Hypophosphite, Phosphate, Oxalate, Sulphate, Ferrocyanide and Nitrate. State by what tests Ferrous salts can be distinguished from Ferric salts. State how a Ferrous compound can be converted into the corresponding Ferric compound.

*E*—What is the chemical composition of "White-Lead?" How is it made? What uses has it in pharmacy and in the arts? With what is it often adulterated, and how can the adulteration be detected?

*F*—What is the distinction between drying oils and non-drying oils—(*a*) in chemical composition; (*b*) in physical properties; and (*c*) in practical applications? Give illustrations of each class.

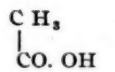
*G*—How do you distinguish the Glucose class of sugars from the Sucrose class? Describe the successive changes that starch undergoes under the influence of dilute acids or ferments. Give the names of the products obtained from starch, and state how they may be identified.

*H*—What is an essential oil, and how do they differ physically and chemically from the fatty oils? Into what several groups may these essential oils be divided? What alteration products often accompany the essential oils? What is the chemical character of these accompanying products? What are the pharmaceutical and technical uses of the essential oils and their products of oxidation?

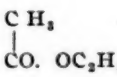
*I*—Write the graphic formulas of *Alcohol*, of *Aether*, of *Acidum Carbolicum*, of *Acidum Benzoicum*, of *Acidum Gallicum*. Give the correct chemical names of "Antifebrin," of "Vanillin," of "Antipyrin."

*K*—Give both the officinal and the exact chemical names for the following compounds:

(1)



(2)



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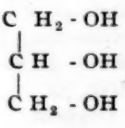
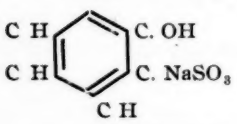
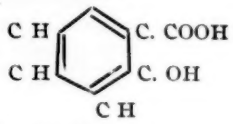


(4)




(5)




QUESTIONS BY EXAMINING COMMITTEE.

*A*—Give the officinal name and definition of the following drugs: *Lactucarium, Tragacanth, Asafœtida, Guarana, Benzoin* and *Storax*. State the botanical name, natural order and habitat of the plants which furnish them, and name an officinal preparation into which each one enters.

*B*—*Acidum Aceticum*. From what and how is it prepared? Briefly outline the process for the purification of the crude acid. Name the three officinal strengths of acetic acid, with the percentage of absolute acetic acid contained in each. How may the presence of (*a*) lead; (*b*) copper; (*c*) sulphuric acid, or (*d*) empyreumatic substances be detected in acetic acid?

*C*—What would one pint of a menstruum weigh, if it consisted of 50 per cent. of alcohol, 30 per cent. of glycerin and water (by weight). What would ten pounds of *Pulvis Jalapæ compositus*, U. S. P., cost, if Cream of Tartar was worth 27 cents per pound and powdered Jalap 35 cents, with 5 per cent. added for labor in mixing?

*D*—Give the officinal and common names of the medicinal substances obtained from *Barosma betulina, Sanguinaria canadensis, Garcinia Hanburii, Eugenia caryophyllata, Cimicifuga racemosa, Fraxinus Ornus, Acipenser Huso, Anthemis nobilis, Physeter macrocephalus* and *Cetraria islandica*. State what part in each constitutes the *Officinal Drug*, and name an *Officinal* Preparation into which each one enters?

*E*—How many parts each of *Potassium Bicarbonate* and *Citric Acid* are required to make one hundred parts of Potassium Citrate? How many parts each of *Sodium Bicarbonate* and *Salicylic Acid* are required to make one hundred parts of Sodium Salicylate?

*F*—Give three tests for *Tannic acid;* two tests for *Gallic acid*. What is the action of pure *ferrous sulphate* on *tannic acid?* How do *Cane sugar* and *Grape sugar* differ toward chemical reagents? Give three tests for distinguishing *Tartaric* from *Citric acid*.

*G*—Name the ingredients which enter into the composition of *Compound Liquorice Powder*. Give the botanical name, natural order, habitat and officinal portion of the plants yielding the constituents thereof.

*H*—Give the botanical name, habitat, medicinal properties and active constituents of *Valerian*. Name four officinal preparations; state briefly how each is made, and how much Valerian would be required to make four pints of a preparation, if each fluid drachm is represented by 10¼ grains.

*I*.—How would you compound the following prescriptions:

℞

Ext. Opii, gr. x
Ext. Krameriæ, ℈i
Camphoræ, gr. xx
Ung. Iodi, ℥i
M. ft. Unguent.

℞

Ol. Copaibæ, ♏ ii
Magnesiæ, gr. ii
Acaciæ pulv., gr. i
M. ft. pil.
Mitte tales xxxvi

Would you dispense this? If so, how would you compound it?

℞

Ext. Ignat. Amar., ʒss
Acid. Sulph. Ar., gtt. xxiv
Elixir. Cinchonæ, fʒvi
M. Sig. A dessertspoonful in a little water after breakfast and after dinner.

*K*—Rewrite the following prescriptions giving the quantities and ingredients in English. State whether it would be proper to dispense them as written; if so, show what additions, if any, should be made. Give your reasons for your judgment.

℞

Morph. Sulph. o | 12
Atropiæ o | 06
Ft. ch. No. x.
One every 3 hour.

℞

Chinin. Sulph. gr. x
Morph. Sulph. gr. ⅙
Dent. tal. dos. No. iv

℞

Pil. Hydrarg. gr x
Morph. sulph.
Pulv. Camph. gr. iij
Ft. Pil. No. vi.
S. One every 2 hours.

SPECIMENS.

| *Materia Medica.* | *Pharmacy.* | *Chemistry.* | *Committee.* |
|---|---|---|---|
| Bryonia. | Aqua Fœniculi. fl | Aqua Chlori. | Gelsemium. |
| Veratrum vir. | Ext. Erythrox. | Acid. Boricum. | Eucalyptus.. |
| Salix. | Lin. Terebinth.. | Acid. Benzoicum. | Sambucus. |
| Quassia. | Liquor Pepsini. | Acid. Gallicum. | Pimenta. |
| Scoparius. | Mist. Amygdalæ. | Sodii chloridum. | Coriandrum. |
| Castanea. | Pepsinum sacchar. | Magnesii sulph. | Pulv. Rhei co. |
| Conium. | Syr. Ferri iodidi. | Ammonii carbon | Aqua Anisi. |
| Stramon. Sem. | Syr. Tolutanus. | Plumbi acetas. | Syr. Rhei arom. |
| Ergota. | Tinct. Calumbæ. | Æther aceticus. | Liq. Ferri Chlor. |
| Catechu. | Vin. Ferri amar. | Saccharum. | Potassii Chloras. |

OPERATIVE PHARMACY.

*Glycerin Suppositories.*

℞

Stearic Acid, . . . . . 10 gr.
Carbonate of Sodium, . . . . . 5 gr.
Glycerin, . . . . . 2 fl. dr.
Make six suppositories.

*Pills.*

℞

Ferri Citrat., . . . . . gr. xlv.
Cinchon. Sulph., . . . . . gr. xv.
Ol. Carui, . . . . . gtt. xv.
M. Ft. pil. No. xv.

Write in English upon the label all of the ingredients and quantities used in the pills.

*Granulated Salt.*

℞

Salicylic Acid, . . . . . 105 gr.
Carbonate of Sodium pure, . . . . . 100 gr.
Make Salicylate of Sodium.

*Emplastrum Belladonnæ.*

Make Belladonna plaster by the following formula:

℞

Ext. Belladonnæ, . . . . . gr. lx
Resinæ, . . . . . gr. cxx
Ceræ Flavæ, . . . . . gr. lx
Emp. Plumbi, . . . . . ℥ ii

*Spread Plaster.*

Spread a Belladonna breast plaster about five inches in diameter.

ANALYTICAL CHEMISTRY.

Officinal salts, inorganic bases, inorganic and organic acids, either in the state of powder or in solution, were given for qualitative examination.

Seventeen candidates, having attained the grade very satisfactory in the examination of crude drugs and in descriptive materia medica, were entitled to compete for the J. M. Maisch prize, offered by Mr. J. H. Redsecker. At the examination which was held April 10, mounted specimens of the following drugs or sections of drugs were submitted: Arnicæ radix, Aurantii cortex, Caryophyllus, Cinchona rubra, Lupulinum, Nux vomica, and Taraxacum; also pollen of species of Pinus (possible adulteration of lycopodium), section of stem of Polygonatum (for determining class and part of plant) and section of cremocarp of Chærophyllum procumbens (for determining order and section, and part of plant). Fifteen candidates were present, all of whom recognized pine pollen; 14 nux vomica; 13 the umbelliferous fruit; 12 taraxacum root; 10 each cinchona and orange peel; 9 lupulin; 7 clove; 5 arnica root, and 4 the monocotyledonous stem. Ten and eight specimens were the two highest numbers recognized; and eleven of the candidates named correctly six or seven of the microscopical specimens.

The names of the successful candidates for the degree of Graduate in Pharmacy (Ph.G.) are given in the following list, which includes also those of several holding over from the preceding year; likewise the titles of the theses presented by the candidates.

Franklin Irving Adams, New York, Liquor Plumbi subacetatis dilutus.
John Maskell Allen, New Jersey, Solvents of Opium.
William Cummings Amsden, Iowa, Absent-minded Pharmacists.
Ferdinand Geisler Angeny, Pennsylvania, Saccharin.
Franklin Muhlenberg Apple, Pennsylvania, Glycerita.
William Appmann, Texas, Syrups by cold percolation.
William Dwight Barnard, Michigan, An investigation of ground Cloves.

Gustavus Adolphus Barwig, Pennsylvania, Bone black..
William Christopher Baur, Jr., Pennsylvania, Barbasco.
Charles Henry Bennum, Delaware, Petroleum.
Abraham Lincoln Besore, Pennsylvania, Estimation of Lycopodium.
Harry Lee Bickel, Delaware, Potassii bitartras.
John Jessiah Bilheimer, Pennsylvania, Syrupus Cubebæ.
Guido Carl Boecking, Pennsylvania, Pharmaceutical economy.
Alexander Carhart Bonnell, New Jersey, Psoralea Melilotus.
John M. Bowman, Pennsylvania, Appurtenances to the modern pharmacy.
William Willits Bright, Pennsylvania, Syrupus Ferri iodidi.
Edward Herman Buehl, Ohio, Officinal preparations of Cubebs.
Zack W. Bugg, Kentucky, Production of Tobacco.
Frank Eugene Burgess, Ohio, Glycerin Suppositories.
Charles Hayes Butters, Pennsylvania, Syrup of Ipecacuanha.
Florence Moore Caldwell, D. Columbia, Elixir of Iron, Quinine and Strychnine.
Clarence Henry Campbell, Maryland, Tinctura Cinchonæ composita (improved).
Clarence Edgar Carritte, Minnesota, Inexhaustion in percolation.
Benj. Franklin Cartwright, Pennsylvania, Eupatorium.
John Francis Cassidy, Pennsylvania, Liquids by weight.
James Truss Challenger, Delaware, Cannabis indica.
Jerome Percy Churchill, California, Adulteration of Potassium nitrate.
Samuel Coleman, Pennsylvania, Strophanthus.
Lemuel Belah Coley, Alabama, Extract of Pinus canadensis.
Francis Wade Cook, Pennsylvania, Tinctura Gentianæ composita.
George Hogan Copeland, Pennsylvania, Erythroxylon Coca.
Frank Wilbert Cotton, New Jersey, Preliminary education of a pharmacist.
William Howard Crane, Pennsylvania, Our noble profession.
James Lawson Crothers, Maryland, Piper methysticum.
James Kimmey Cullen, Delaware, Hypodermic tablets.
Dwight Kellum Darling, Washington (state), Art in pharmacy.
Frederick Samuel Day, Pennsylvania, Camphora.
Charles James Deitz, Pennsylvania, Celastrus scandens.
Peter Nicholas Duff, Ireland, Extractum Humuli fluidum.
Frederick Dunning, Maryland, The Oleo-saccharures.
Richard Gaillard Dunwody, Georgia, Turpentine.
Ernest Godlove Eberhardt, Indiana, Prickly ash bark.
William Fred. Eberhardt, Wisconsin, Hoang Nan.
Edwin Kemmerer Eisenhart, Pennsylvania, Iodum.
Henry Shaffer Engelman, Pennsylvania, Chloroform as an antifungoid.
Harvey Bowman Eyer, Pennsylvania, Manufacture of illuminating gas and by-products.
Joseph Benjamin Faries, Delaware, Rhamnus Purshiana.
George David Feidt, Maryland, Commercial Rhubarb.
Benjamin Kennard Fletcher, Pennsylvania, Examination of some acids.
Edward Elmer Frontz, Pennsylvania, Quillaia.
Harry Jacob Gearhart, Pennsylvania, Cydonium.
Wm. Joseph Napoleon Gervais, New York, Unofficinal Syrups.
Elmer Ellsworth Gibble, Pennsylvania, Antipyrine.

Charles A. Gill, Pennsylvania, Morphology of flowers.
Philip Goll, Germany, The U. S. Pharmacopœia of 1890.
Samuel Horace Gotwalt, Pennsylvania, Tinctura Strophanthi.
Archibald Alexander Gracey, Pennsylvania, Sarothamnus scoparius.
Joseph Thomas Griffith, Maryland, Decolorized Tincture of Iodine.
Marlborough Hall, Pennsylvania, Erythroxylon Coca.
Samuel Tilden Hamberg, Pennsylvania, Nitroglycerin.
William Handler, Ohio, Syrupus.
Luther Grant Harpel, Pennsylvania, Benzoin.
William Grant Haupt, Pennsylvania, Diastase and Pepsin.
Fred. William Haussmann, Pennsylvania, Orange and Turpentine group.
Chas. Palmatary Hendrickson, Delaware, Tincture of Vanilla.
Frank Augustine Hennessy, Michigan, Lupulin.
George Winters Herbein, Pennsylvania, Percolation.
Daniel Henry Hills, New York, Elixir adjuvans.
William Ellwood Hinkson, Pennsylvania, Piscidia Erythrina.
John Almer Houghton, Utah, Growing evils of pharmacy.
Carrie Emily Howard, Pennsylvania, Women as pharmacists.
Frank Stacker Hughes, Pennsylvania, Salicylic acid.
Henry John Humma, Pennsylvania, Honey.
H. Lewis Hurxthal, Ohio, Codeine.
Charles Pim Jacob, Pennsylvania, Extractum Digitalis fluidum.
Charles Mathias Jager, Tennessee, Panax quinquefolium.
Edwin Leonard Janson, Ohio, Verbasci flores.
William Anthony Johnson, Pennsylvania, The Hypophosphites.
Henry Draper Jump, Delaware, Citrate of Iron and Quinine.
Augustus Herman Keller, Pennsylvania, Syrupus Hypophosphitum cum Ferro.
Ben C. Keller, Iowa, Extractum Dulcamaræ fluidum.
Allen Jesse Kendig, Pennsylvania, The detection of Paraffin in Beeswax.
Harry Milton Kennedy, New Jersey, Coal tar and its products.
Franklin Kern, Pennsylvania, Chloral hydrate.
Frank Kurtz Kitzmiller, Pennsylvania, Adiantum pedatum.
Milton Henry Koons, Pennsylvania, Organic fermentation.
Richard C. Krider, Pennsylvania, Medicinal Wines by fermentation.
William Henry Kunkel, Pennsylvania, Extractum Grindeliæ fluidum.
Charles Lehman, Illinois, Oleate of Mercury.
Charles Neal Leigh, New York, The model Drug Clerk.
Albert John Livingood, Pennsylvania, Transverse sections.
William Loesch, Pennsylvania, Syrupus Acidi Hydriodici.
Sydney Allen Lowry, Pennsylvania, Gossypium herbaceum, its culture and products.
John Sanford Mack, Pennsylvania, Collodium stypticum.
Madison Lovett McCullough, Pennsylvania, Glycyrrhiza lepidota.
John R. McIntosh, Ohio, Phosphorus and its compounds.
William Frederick Martin, Kansas, The successful Pharmacist of to-day.
Charles Borden Miller, N. Carolina, Oleum Olivæ.
Solomon Miller, Maryland, Hydrargyri Chloridum mite.
Mary O. Miner, Kansas, Professional Pharmacy.

Wm. David Moore, Pennsylvania, Potassii bitartras.
Edward Moor, Jr., Pennsylvania, Extractum Buchu fluidum.
John William Morrison, Nova Scotia, Marrubium vulgare.
John Dunaway Mulheron, Tennessee, Strophanthus.
Emmett Leroy Murray, Georgia, Turpentine.
William Moseby Nolin, Missouri, Pills.
Emile Alphonse Perrenot, Pennsylvania, Elixirs, and Syrup of Yerba Santa.
Charles Alfred Pfeiffer, Maryland, Antifebrin.
Geo. Clinton Potts, Pennsylvania, Hydrastis canadensis.
John Nicholas Prass, Ohio, Benzoin and its uses in pharmacy.
Edwin Alfred Prior, Pennsylvania, Adulteration of Glycerin.
Ralph Maynard Read, Pennsylvania, Analysis of Citrullus.
David John Reese, Pennsylvania, Crocus.
Emil Reith, Pennsylvania, Citrine ointment.
Charles Reynolds Rhodes, Pennsylvania, Drug mills.
Gustave Adolph Richter, Pennsylvania, Erythroxylon Coca.
Howard Rohrer, Pennsylvania, Mentha piperita.
Eben Jackson Ross, Pennsylvania, Eriodictyon glutinosum.
H. Frank Ross, Pennsylvania, Glycyrrhiza glabra.
Samuel Geo. Jeremiah Roth, Pennsylvania, Abstracts.
Jacob Albert Rudy, Pennsylvania, Unguentum Bismuthi oleati.
William Ruoff, Pennsylvania, Officinal tests for Lithium salts.
Frank Parke Rutherford, Pennsylvania, Hamamelis.
Joseph Frank Sample, Pennsylvania, Assay of drugs.
Frederick Martin Schick, Ohio, Extractum Cubebæ fluidum.
Harry Ellsworth Schindel, Maryland, Chemical Force.
William Schleif, Jr., Wisconsin, Crystalline principle in Persimmon bark.
Albert Schultz, Pennsylvania, Podophyllum.
J. John Schoff, Maryland, Fermentation.
Leonard A. Schoppe, Missouri, Artificial Gum.
Frederick Abraham Schraedly, Pennsylvania, Oleo-stearate of Mercury.
Theodore William Scott, Pennsylvania, Ipecacuanha.
Edward Parke Sheafer, Pennsylvania, Yerba Santa.
John Peter Sheehan, New York, Explosions and explosives.
Alfred Frederick Schomberg, Pennsylvania, Simple Elixir.
Joseph Frith Shreve, Illinois, Erythroxylon.
William Grant Shugar, Pennsylvania, Fluid Extract of Buchu.
George Walter Sipe, Pennsylvania, Pills.
Albert Webster Smedley, Pennsylvania, Pepsin.
Charles Oscar Smith, Pennsylvania, Gossypium herbaceum.
Fred Harlow Smith, Massachusetts, Fabiana imbricata.
Fred William Smith, Ohio, Facts concerning pharmacy.
Stephen Gregory Snuggs, Missouri, The art of making Suppositories.
Howard Grant Snyder, Pennsylvania, Assayed fluid extracts.
Joseph Louis Sombart, Kansas, Astragalus mollissimus.
Maximilian Sonntag, Pennsylvania, Tincture of Nux vomica.
George Lewis Sontag, Wisconsin, Hedeoma.
Thomas Raibe Southerland, N. Carolina, Starch.

John Stuart Stevenson, Pennsylvania, Syrupus Acidi Hydriodici.
Harry Von Hoff Stoever, Pennsylvania, Hydrastis and its derivatives.
Samuel Martin Strohecker, Pennsylvania, Elixir Quiniæ Ferri et Strychniæ.
Harry Harlan Swainbank, Pennsylvania, Compound Syrup of Benzoin.
Ebenezer Francis Thompson, Pennsylvania, Bitartrate of Potassium.
William Franklin Thompson, Pennsylvania, Compound Elixir of Taraxacum.
Frank Frazier Thomson, Pennsylvania, Ichthyol.
Charles Cowdrick Trauck, Pennsylvania, Extracta fluida.
Herbert Wilkinson Turner, Pennsylvania, Antipyrine.
George Cone Tyler, Pennsylvania, Arsenic.
Thomas Van Dyke Tyler, Pennsylvania, Illuminating gas.
Samuel Elliott Uhler, Pennsylvania, Advantages of manufacturing.
John Adams Van Valzah, Pennsylvania, U. S. P.
Harlan Lewis Wallace, Delaware, Oleite.
Hite Watson, West Virginia, Antipyrine.
Frederick Andrew Weiss, Colorado, Sierra salvia.
Frederick Barton Wells, New Jersey, Pharmaceutical etiquette.
Oscar Connor Welsh, Pennsylvania, Ointment of oleate of copper.
William Custer Wescott, New Jersey, Unfermented grape juice.
Herman Westphal, Germany, Native Wyoming soap.
Martin Inventius Wilbert, New York, Aluminii acetas.
Daniel Albert Williams, Pennsylvania, Erythroxylon Coca.
John Elmer Wishart, Pennsylvania, Extractum Jalapæ alcoholicum.
Albert Elam Ferree Witmer, Pennsylvania, Botany and zoölogy.
Frederick Joseph Wolf, Pennsylvania, The effect of heat and light on plants.
Junius Pascal Woodall, N. Carolina, Gossypium herbaceum.
Harry Worrall, Delaware, Betula lenta.
Frank Gerald Yohn, Pennsylvania, Pharmaceutical education and its advantages.
Robert William Zeigler, Pennsylvania, The Pharmacist.

States and Countries represented by the Graduating Class: Alabama, California, Colorado, Dist. Columbia, Ireland, Kentucky, Massachusetts, Michigan, Minnesota, Nova Scotia, South Carolina, Texas, Utah, West Virginia and Washington, each 1 graduate; Georgia, Germany, Indiana, Illinois, Iowa and Tennessee, each 2 graduates; Kansas, Missouri, North Carolina and Wisconsin, each 3 graduates; New Jersey and New York, each 6 graduates; Delaware, Maryland and Ohio, each 9 graduates; Pennsylvania, 100. Total, 178 graduates.

In response to an invitation from the Faculty, the members of the graduating class assembled at the college on the evening of Wednesday, April 16th, and, with the officers and trustees of the college, sat down to a supper, which was served in the spacious museum. Music by the amateur orchestra, singing by the Zeta Phi Glee Club, toasts and speeches closed the exercises at the college in a most pleasant manner.

The Commencement took place at the Academy of Music on the evening of April 17, the members of the graduating class wearing collegiate caps and gowns. During the session, they had made application to the Board of Trustees for permission, which was granted, with the provision that if the class adopted the cap and gown, they should be worn by every candidate present. President Charles

Bullock conferred the degree of Graduate in Pharmacy, Ph.G., upon the candidates named above, after which the Dean announced the names of the students who, at the examinations, had earned honorable mention with the grade distinguished: J. W. Morrison and Wm. Schleif, Jr.; and with the grade meritorious: E. G. Eberhardt, W. Handler, F. W. Haussmann, M. L. McCullough, J. J. Schoff, T. W. Scott, H. G. Snyder and M. I. Wilbert. The Henry C. Lea Prize, $100, for the most meritorious researches recorded in the graduating dissertations, was equally divided between E. G. Eberhardt and J. W. Morrison. The Pharmacy Prize, a gold medal, offered by Prof. Remington for original pharmaceutical work, was awarded to C. C. Trauck, with honorable mention of S. E. Uhler, S. G. Snuggs, F. M. Apple, G. C. Boecking and F. Dunning. The recipient of the chemical balance, offered by Prof. Sadtler for original quantitative analysis, was R. G. Dunwody, with honorable mention of E. G. Eberhardt and J. W. Morrison. The Analytical Chemistry Prize, $25, offered by Prof. Trimble for original chemical work not in connection with the thesis, was carried off by E. G. Eberhardt, honorable mention being made of R. G. Dunwody. Mr. Eberhardt also received the John M. Maisch Prize of $20, in gold, offered by Mr. J. H. Redsecker, of Lebanon, Pa., for histological knowledge of drugs, honorable mention being made of F. M. Apple, W. D. Barnard, P. N. Duff, W. Handler F. W. Haussmann, C. M. Jager, W. A. Johnson, M. L. McCullough, J. R. McIntosh, J. W. Morrison, W. Schleif, T. W. Scott, H. G. Snyder, H. H. Swainbank and M. I. Wilbert. G. D. Feidt received the Operative Pharmacy Prize, offered by Mr. E. L. Boggs, of Charleston, W. Va., $25 in gold, and honorable mention was earned by Mrs. M. O. Miner, A. Schultz and J. J. Bilheimer. The prescription balance, offered by Mr. H. J. Maris for the best examination in theoretical pharmacy, was awarded to L. A. Schoppe, with honorable mention of T. W. Scott, F. A. Hennessy, F. H. Smith, J. M. Allen, S. M. Strohecker and F. G. Angeny. The last prize awarded was the gold medal offered by Mr. James Robinson, of Memphis, Tenn., for proficiency in chemical knowledge and analytical work. E. G. Eberhardt was the recipient of it.

The Valedictory Address was delivered by Prof. Remington, as follows:

*Graduates.*—The words which you have heard this evening from the President of the College, publicly proclaiming your fitness to practise your profession, are indeed welcome words to you; your friends who fill this vast auditorium are here to testify to their regard for you, and to exhibit their appreciation of the qualities which you have shown during your laborious time of probation.

The last four years of your lives will probably be remembered in the future, as years filled with toil, self-denial, tribulation, and disappointment; but this hour will forever stand out sharp and clear on the horizon of your memories filled with "happiness o'erflowing and joy supreme."

To attempt in the few minutes, that remain of our official relations as instructor and student, to force you to listen to hackneyed advice and well-worn platitudes is not my intention; in times of exultation and unalloyed pleasure the healthy mind rejects everything but roseate-hued prospects; it is futile to predict disaster or failure, and oracles and seers who see aught but glowing successes in the future are relegated to obscurity.

But this grand old College, which has nurtured and adopted you, is true as steel, for whilst she can share in your enthusiasm with a full heart and bid you rejoice and be merry, for now is the hour of your triumph, she can also say to you "*Festina lente.*" Her wisdom goes hand in hand with her love, and not one of the ten thousand students who thronged her halls during the last seventy years can be found who will fail to accord to her the palm that she deserves for honest faithful service in training her sons and her daughters.

Your commencement in pharmacy occurs at an auspicious time. You enter the business (for it is a business as well as a profession) at a time of depression; when sharp competition has forced many who are incapable or ignorant out of its ranks; you hear on all sides the most gloomy predictions regarding future prospects, and notwithstanding the unusual and unconventional nature of the statement, I utter it fearlessly, that these circumstances make the time auspicious for one beginning pharmaceutical life.

You will receive your training in financial management during a period of forced economy; safe, conservative business maxims, which the prudent and experienced never neglect even in times of inflation, will appear to you now as worthy of being carefully followed; if they are duly heeded by you now, at the outset of your career their value will soon become apparent, and you will insensibly be drawn into moderate and correct habits of life and thought and you will be able then to better withstand the "shock of prosperity," which will surely come to you sooner or later if you begin in this way; let your minds rest for a moment in contemplating the career of those of your friends who have gone before. Cannot most of the failures be traced to inability to withstand the temptations of a little prosperity; for with it, how often comes exalted ideas for the future, extravagant expenditures and wild dreams ending in disaster. Caution, conservatism and industry are absolutely necessary in these perilous times, and as they are attributes, which the successful pharmacist must always possess, either in adversity or prosperity, it follows as surely as "light does the day" that you have nothing to lose by adopting these, but everything to gain.

What is to be your future in Pharmacy? In these days of specialties it is common to strictly limit the usefulness of active agencies to their own sphere, with the object of concentrating labor and developing the greatest excellence; the apostles of this creed would probably argue that the objects of the existence of the Philadelphia College of Pharmacy were thoroughly realized when your hands had been trained to spread plasters, roll pills or make an assay, or when the gray matter of your brains had absorbed sufficient pharmacy to decipher correctly a badly-written prescription or write a learned essay on the correct method of differentiating medullary rays from fibro-vascular bundles; but I can assure you, graduates, that the foundation upon which the superstructure of this College is reared, are broader and deeper than this; her aims are to elevate Pharmacy and to inculcate correct views of professional duty.

The "Philadelphia College of Apothecaries," which, upon being chartered in 1822, became the Philadelphia College of Pharmacy, declared the object of its existence to be for the purpose of cultivating, improving and making known a knowledge of Pharmacy, its collateral branches of science and the best

modes of preparing medicines and compounds, and of giving instruction in the same by public lectures, and the code of ethics subsequently adopted by the College, opens with the following preamble:

"The pharmaceutical profession being one which demands knowledge, skill and integrity on the part of those engaged in it, and being associated with the medical profession in the responsible duties of preserving public health and dispensing the useful though often dangerous agents adapted to the cure of disease, its members should be united on some general principles to be observed in their several relations to each other and to the medical profession and to the public. The Philadelphia College of Pharmacy being a permanent incorporated institution, embracing among its members a large number of respectable and well-educated apothecaries, has erected a standard of scientific attainments, which there is a growing disposition on the part of candidates for the profession to reach, and being desirous that, in relation to professional conduct and probity, there should be a corresponding disposition to advance, its members have agreed upon the following principles for the government of their conduct."

Most excellent recommendations follow for the guidance of the members of the College, and the principles which are to be disseminated are most clearly expounded. The 7th clause of the Code raises aloft the banner of "purity and honesty" in the pharmaceutical products as follows: "As the apothecary should be able to distinguish between good and bad drugs, in most cases, and as the substitution of weak or inert drug for an active one may, negatively, be productive of serious consequences, we hold that the sale of impure drugs or medicines, from motives of competition or desire of gain, when pure articles of the same may be obtained, is highly culpable, and that it is the duty of every honest apothecary or druggist to expose all such fraudulent acts as may come to his knowledge. But in reference to those drugs which cannot be obtained in a state of purity, we should, as occasion offers, keep physicians informed of their quality, that they may be governed accordingly."

This College, even at the beginning of its career, regarded it a crime to acquire knowledge with the intention of using it to feed the monster avarice at the expense of the health and lives of the sick and suffering; and as technical knowledge of a high order is necessary to detect adulterations, and as the public generally are unable to recognize frauds and substitutions, there is usually no protection and nothing to stand between danger and safety, disease and health, villany and integrity, but the high character of the pharmacist, and what a priceless jewel this is.

> The Stoic was not wrong;
> There is no evil to the virtuous brave,
> For in the battle's rift, or on the wave,
> Worshipped or scorned, alone or mid the throng,
> He is himself—a man: not life's nor fortune's slave.

It will thus be seen, Graduates, that, in avowing to-night allegiance to your Alma Mater, you have assumed no light responsibility; for although you are not members of the College, you are Graduates, and in accepting her Diploma you become her children, and her honor is henceforth in your hands. We cannot believe that one of you who has toiled faithfully during these long years to

acquire this knowledge intends, when out of the reach of her fostering care, to misuse it, to throw away great opportunities, and to bring disgrace to her escutcheon.

An old English poet has said:

> Knowledge, when Wisdom is too weak to guide her,
> Is like a headstrong horse, that throws the rider.

And now we send you forth on your mission with confidence and trust, in the full belief that you are thoroughly instructed in your life's calling; you will separate to-night and will soon realize to the full, the sweetness and power of that place in your hearts so dear to all of you, "home." Some of the faces of your class-mates that are so happy to-night and that you have learned to love, you will never see again, the scene of your life's work will probably be thousands of miles from that of your friend who has stood by you shoulder to shoulder in your labors in this city of Brotherly Love; but it makes no difference how far you may be separated from those who know you and care for you, nor how great your trials may be; there still lives one, whose watchful care never tires, whose heart will ever beat in sympathy with yours in your earnest aspirations for light, and in parting with her loyal children to-night, she bids you one and all to ever cherish the memory, the precepts, the example of the Philadelphia College of Pharmacy. Farewell.

As usual the Commencement exercises were interspersed with music, and closed with the distribution of the floral and other presents sent by friends for a number of the graduates. We are pleased to note the fact that this custom of the public distribution of friendly presents continues on its rapidly-declining scale, and it appears to us that the time is near at hand when the example set by other institutions should be followed, of confining such distribution to the green-room.

## EDITORIALS.

*The present number* of the JOURNAL contains 64 (instead of 48) pages, to make room for an account of the exercises connected with the annual examinations and commencement. The amount of original papers and of other matters, which should not appear later than the May number, is such that we have been compelled to defer, until June, the publication of several papers, of chemical notes, abstracts and of Association notices.

*Standardization.*—During the past few years the editor has made no comments on the discussion upon this subject as carried on by medical and pharmaceutical journals, in the hope that some positive proofs might be forthcoming demonstrating the asserted superiority of standardized preparations of vegetable drugs over such made in the customary way from the same drugs well authenticated according to the Pharmacopœia. Such proof has not been produced, nor has it been shown that standardized preparations vary less in the percentage of the leading therapeutically active constituent than does the properly selected drug. In another place we show the reason why, in certain cases, the Pharmacopœia had to adopt processes of assay, and to what extent they had to be carried in order to produce entirely trustworthy results. The propositions thus far made for the extension of the principle introduced into the Pharmacopœia thirty years ago, lack, in our view, those features of exactness which are observed in the processes adopted in the last edition, though it

is not, and need not be, claimed that these processes were not susceptible of improvement.

It will thus be seen that this is one of those important questions in which different persons are likely to honestly differ in opinion, and there is no need of charging incompetency or sinister motives to the advocates of either plan, who may discuss the question from the standpoint of the physician or of the pharmacist, and not from that of the manufacturer who from his special facilities, is obviously interested in the decision of the problem in one way.

Physicians and pharmacists are agreed that medicines should be as definite as possible. We think that the weight of pharmaceutical experience, and also of chemical determinations, is not in favor of the movement, certainly not on the scale proposed in some quarters. Whether physicians really do want such preparations, is for them to determine; not for the few, but for those who can with authority speak for the profession of the country; but, whether adopted by the Pharmacopœia or declined, whether the old-fashioned tinctures, etc., be standardized or a new class of preparations be introduced, the honest wants of the physician will always be supplied by the reputable pharmacist.

The papers printed in the present number do not present all the arguments that may be advanced either in favor or opposition of the measure in question, but they probably give the strongest and most prominent points on both sides, and as such, it is hoped, they may be found useful in arriving at a final conclusion.

*Renewal of Registration in Pennsylvania.*—The following notice, which has just been issued, is of especial interest to the pharmacists of Pennsylvania:

The State Pharmaceutical Examining Board of Pennsylvania hereby gives notice that registration under the Pharmacy Act of 24th May, 1887, must be renewed every three years.

The registration of all persons who were registered during the first period of ninety days, by reason of having been engaged in the retail drug business in Pennsylvania at the date of the passage of the Pharmacy Act, will expire between August 13 and November 18, 1890.

All persons who are registered under this act, either by reason of having been engaged in the retail drug business when the act was passed, or under section eleven, or by examination, should apply to the Secretary of the Board for renewal of registration *about ten days before the expiration of three years from the date of their certificate*, and enclose the fee of one dollar.

As the act contains no provision for *days of grace* in applying for renewals, such applications must be promptly made, as stated in the foregoing paragraph, or the registration will be forfeited.

In applying for renewal of registration, give number of certificate and state whether Registered Pharmacist or Qualified Assistant, *but do not return the certificate*. Give name and address in full, and also address when first registered, if any change has been made.

ALONZO ROBBINS, President, Philadelphia.
H. B. COCHRAN, Secretary, Lancaster.
F. H. EGGERS, Allegheny City.
A. J. TAFEL, Philadelphia.
A. B. BURNS, Montrose.

LANCASTER, April 21, 1890.

*Pharmacopœial Weights and Measures.*—The following circular explains itself, and deserves the careful unbiassed consideration of every pharmacist and physician. It is addressed to the professions of medicine and pharmacy, and the medical and pharmaceutical colleges of the Unites States and Canada:

At the last meeting of the *American Association for the Advancement of Science*, held at Toronto, Can., September, 1889, the undersigned were appointed a committee to promote the use of the metric system of weights and measures among professional men, and especially to secure its more general adoption by the physicians and pharmacists and the chemical and pharmaceutical manufacturers of our country.

The metric weights and measures were legalized in this country by Congress in 1866, and are now in actual use by most students of natural history, by some scientific periodicals, by the graduates of our schools of civil and mining engineering, and especially by all scientists and chemists throughout the world, without regard to their mother tongue. It is nevertheless greatly to be regretted that a large majority of our physicians, pharmacists and druggists still continue to ignore its merits or discountenance its adoption.

The merits of the metric system have been so thoroughly recognized that it is adopted by most civilized nations. Further argument should be unnecessary to secure its universal adoption in our hemisphere, where it is already in exclusive use by all the states of Southern and Central America.

It is a strange and irreconcilable fact, that the Governments of Great Britain and the United States, or the English-speaking peoples, should stand quite alone in their stubborn and persistent adherence to the use of heterogeneous standards of weights and measures, completely devoid of system in themselves, or of any practical and rational relationship to each other. And it is especially strange, in view of the practical utility of the metric system, that the professions of medicine and pharmacy in this country should in this respect at the present time, be behind the various arts of engineering, as must be conceded by those familiar with the facts.

This condition of things is not due to any inherent defects in the system itself, but to indolence and a want of practical acquaintance with the metric system which largely amounts to positive ignorance, that is unjustifiable, since it hinders the proper assimilation of the great mass of scientific literature in which the system is exclusively used, tends to increase the risk of errors in our professional work and imposes much unnecessary labor on the student.

The educated representatives of medicine and pharmacy in this country favor and would gladly adopt the metric system, but find their efforts in this direction constantly hampered and nullified by the opposition of a large number of both professions who, through conservatism or lack of education, fail to unite in any concerted effort for its more general adoption and use.

It is unnecessary here to expatiate on the advantages of the metric system of weights and measures. The identity of the single factor with our system of numeration, the perfect correspondence between measures of weight and capacity, its approval by a large majority of the nations of the world, and especially its actual use by scientists and chemists without exception, render its ultimate adoption by all arts dependent on natural sciences and especially by medicine and pharmacy, a matter of necessity and certainty. Its adoption is

not to be viewed as an experiment as would be such modifications of our present forms as have been proposed by some individual enthusiasts and which have received but little consideration by any but their inventors.

The argument that our system of weights and measures is the same as that in use in Great Britain, with whom we have most intercourse, is without foundation. The system we use is well called the *American system*, for no other nation uses it. The *Troy* pound has been abolished in Great Britain, and no longer appears in their text books and the fluid measures are different in the proportion of 4 to 5.

If identity is to be preserved between our measures and those of any other nation, some change must be made, and we believe there is substantial unanimity in a preference for the metric system as in place of our old system if any change is made.

It is wholly unnecessary to defer the adoption of this much-needed reform until the prejudices, fallacious arguments, or educational deficiencies manifested by a large contingent of pharmacists and physicians shall have been overcome. Such a period must necessarily be remote, and indefinite, while the method herein proposed avoids any delay. The difficulty of securing any change on the part of men already in active business is well shown by the fact, that the simple innovation in the present U. S. Pharmacopœia of expressing quantities in *parts by weight*, demonstrates how large a number of pharmacists are incapable of comprehending so simple a relationship when applied to the complicated empirical and antiquated systems of weights and measures in present use.

One of the principal reasons why the metric system has not yet been adopted in this country by professional men, is the indifference shown by our professional schools. Every student of medicine and pharmacy is practically obliged to learn a system of weights and measures new to him when he begins professional study. He may have learned the Apothecary tables in his school days, but he has not used them, and as elements of thought the grain and drachm are entirely new to him. If the gram and cubic centimeter are substituted for them, no additional labor is entailed upon the student. It must not be supposed at the present time, that professors who are really competent, are ignorant of this system, and hence this change would not entail any additional labor on the professors. In fact it would diminish the labor, of both professors and students, for in medical schools at the present time, instruction is given in both systems, and it would simply make the methods of instruction uniform in the chairs of materia medica, pharmacy and chemistry, where now is a confusion.

The Pharmacopœia does not now recognize the Troy system, and if the doses were taught in metric terms only, the old system would die out with the passing off of the present generation of practitioners. No inconvenience would be caused to any one, those who are too old to learn, could go on using their present mode, and the new graduates would use that which they are taught.

It should be particularly remembered that we are not trying to introduce a new system, but to drop an old one, which is as irrational and unscientific as any other relic of barbarism. *It is especially opportune at this time when a*

*new revision of the Pharmacopœia of the United States is pending, that the Committee of Revision, as well as the Pharmacists, Druggists, and Physicians of this country, should have their attention particularly directed to this important subject.* For the use of these professions, six lines contain all that is necessary, as follows:

1,000 milligrams make one gram.
1,000 grms or cubic centimeters make one kilo, or liter.
1,000 kilos make one ton.
65 milligrams make one grain.
15½ grains make one gram.
31 grams make one ounce Troy.

In writing prescriptions, a vertical line should be drawn between grams and milligrams, all figures on the left read grams, all on the right to three figures, respectively deci-, centi-, and milligrams.

Chemists think in milligrams and grams only, and pharmacists and physicians may do likewise, reducing our system to two denominations only. In the arts the milligram is not divided.

As the metric system is legal throughout the United States any physician is entitled to present a metric prescription to the druggist. All boards of examiners in medicine and pharmacy, whether state or collegiate, are justified by law to exact, and *should demand from every candidate for graduation or for a license a knowledge of the metric system.*

We also earnestly recommend that Schools of Medicine cease to give instruction in the apothecary system of weights and measures for which there is no longer any reason, and that in the Schools of Pharmacy the merits of the metric system should be presented with the prominence that its utility, and the near prospect of its adoption justify, in the best way to secure its immediate use as the exclusive system of weighing and measuring in medicine and pharmacy, and in the manufacturing arts correlative with them. And for the further promotion of this object, we recommend that an addition be made to the pharmacy laws now in force in most of our States, prescribing that all persons receiving a license to sell drugs and dispense medicines shall be required to provide themselves with a set of metric weights.

PROF. WM. H. SEAMAN, Washington, D. C.
DR. FRED. HOFFMANN, New York.
PROF. ROBT. B. WARDER, Washington, D. C.
*Committee A. A. A. Sc.*
PROF. T. C. MENDENHALL, *Presid. A. A. A. Sc.*

April 15, 1890.